THEORETICAL FOUNDATIONS OF MATHEMATICS INSTRUCTION
MATH 510     FALL 2004

INSTRUCTOR: Dr. Diana F. Steele
357 Watson Hall
Northern Illinois University
DeKalb, IL  60115-2888

Office Hours: TBA
Class Meetings: 6:00-8:40 TH
Telephone: 815-753-6755
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COURSE OBJECTIVES: The objectives of Math 510 are: (1) to familiarize you with current research
and development in human learning that relate to mathematics learning, instruction and curriculum; (2) to
introduce you to broad curriculum, learning and teaching issues that affect mathematics education; and
(3) to introduce you to historical perspectives in mathematics education.

Course Requirements
Required texts:

Reston, VA. National  Council of Teachers of Mathematics.

Supplemental Readings furnished by instructor.

Recommended Texts:
Reston, VA: Author.

Course Evaluation
Your final grade will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Discussion Facilitator</td>
<td>10</td>
</tr>
<tr>
<td>Manipulative or Program Presentation</td>
<td>10</td>
</tr>
<tr>
<td>Current Issue Paper and Presentation</td>
<td>15</td>
</tr>
<tr>
<td>Reflective Writing</td>
<td>15</td>
</tr>
<tr>
<td>Document Presentation</td>
<td>10</td>
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<tr>
<td>Discussion Synthesis</td>
<td>5</td>
</tr>
<tr>
<td>Attendance and Participation</td>
<td>15</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: I expect assignments to be completed on time even if you are absent. Assignments are due at the
beginning of the class period. No assignments will be accepted after December 2.

The grading scale will be approximately as follows:

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</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>
</tbody>
</table>
**Course Assignments**

You will have six assignments across the semester. They are as follows:

1. **Class Discussion Facilitator.** You will lead the class discussion of the assigned readings for one class session during the semester. You will prepare questions in advance of the session that will illuminate and generate discussion on the themes and issues raised in the assigned readings. Prepare a typed set of the questions, which you will give to me at the beginning of the class period.

2. **Manipulative/Instructional Aid or Program Presentation.** You will select a manipulative/instructional aid or mathematics program from the list below. You will prepare and submit a typed (double spaced) discussion of your selection. This discussion should include the history and use of the manipulative/instructional aid or program. You will develop a 20-30 minute presentation for the class.

   If you select a *manipulative or instructional aid*, you will briefly introduce it by telling how it can be used in the classroom. After your introduction, you will lead the class through one or more activities with the manipulative or instructional aid. You may choose the grade level(s) for the activities.

   If you select a *mathematics program*, you should briefly discuss the underlying philosophy of the program. After introducing the program, you will lead the class through one or more lessons or activities from the program. You should bring various components of the program (e.g., textbooks, lessons) to share with the class.

<table>
<thead>
<tr>
<th>Manipulative or Instructional Aid</th>
<th>Mathematics Program</th>
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</thead>
<tbody>
<tr>
<td>Cuisenaire Rods</td>
<td>Connected Mathematics (Grade 6–8)</td>
</tr>
<tr>
<td>Geoboards</td>
<td>Mathematics in Context (Grades 5–8)</td>
</tr>
<tr>
<td>Dienes Materials (Base-Ten Materials)</td>
<td>Navigating Through Algebra</td>
</tr>
<tr>
<td>Algebra Tiles/Blocks</td>
<td>Navigating Through Geometry</td>
</tr>
<tr>
<td>Fraction Circles/Squares/Bars/Strips</td>
<td>Investigations of Number, Data, and Space (K–Grade 5)</td>
</tr>
<tr>
<td>Mathematics Portfolios</td>
<td>Everyday Mathematics (K–Grade 6)</td>
</tr>
<tr>
<td>Mathematics Journals</td>
<td>UCSMP</td>
</tr>
<tr>
<td>Software (e.g., Geometer’s Sketchpad)</td>
<td>Contemporary Mathematics in Context (Core-Plus)</td>
</tr>
<tr>
<td>Web-based resources</td>
<td>Mathematics: Modeling Our World (COMAP)</td>
</tr>
<tr>
<td>Graphing calculators</td>
<td>Lawrence Hall of Science (Space/Equals)</td>
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<td></td>
<td>Illuminations</td>
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<tr>
<td></td>
<td>MSG</td>
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3. **Current Issue Paper and Presentation.** (due November 11). You will write (and type, double spaced) an 8 to 10-page paper about a topic related to mathematics curriculum, learning mathematics, or teaching mathematics. You should select a topic for which a reasonably well-defined body of research is available. I suggest you begin your search by examining some of the following: *A Research Companion to the Principals and Standards for School Mathematics* (NCTM, 2003); *Handbook of Research on Mathematics Teaching and Learning* (Grouws, 1992); *Handbook of Research on Teaching* (Richardson, 2001). You should include in your paper the implications of your topic for teaching practice (teaching, learning, curriculum development, or curriculum implementation). You should include specific reference citations in your paper and a list of references (APA style). You must have at list 10 citations in your reference list. You will present a 10-minute report of your paper to the class.

4. **Reflective/Interpretive Writing.** Writing can be a powerful tool for thinking about and learning mathematics. We will experiment with writing in our course as a vehicle for reflecting on what we are thinking and learning about the themes and issues around which the course is organized. You will write each week about your own sense-making of the ideas. The aim is to provide a formal way for you to
critically reflect about the ideas that emerge through the course readings and activities. I will collect your writing each week. Occasionally, (at least six times) you will be ask to write at the beginning of class about some issue from your readings. I will respond to your writings with my own written feedback. I would prefer the reflective writings done out of class be typed.

5. Document Presentation. You will prepare (and type, double spaced) a two- or three-page summary of an assigned document related to mathematics education. In the summary, you will outline the major points of the document. Prepare a handout for each class member. Begin the handout with the complete citation (APA style) for the document. Prepare a 15-minute class presentation for class members.

You may choose from the following list:


Third International Mathematics and Science Study (TIMSS)
TIMSS-R

National Assessment of Educational Progress (NAEP) Most recent.


6. Discussion Synthesis. For one class session during which you are not the discussion facilitator, you will write (and type, double spaced) a synthesis of the class discussion of the readings. This synthesis is due the next week after the discussion. The goal is to provide a formal way for you to critically reflect on the ideas that emerge through the course readings.

FINAL EXAM, THURSDAY, DECEMBER 9, 6:00-7:50 P.M.
Schedule for Assignments

Class discussion facilitator: See sign-up sheet
Manipulative or program presentation: See sign-up sheet
Current issue paper: November 11
Reflective writing: Every week (out of class) and six times (in class)
Document presentation: See sign-up sheet
Discussion synthesis: See sign-up sheet
Final exam: December 9, 6:00-7:50 pm

Note: Students with Disabilities

NIU abides by Section 504 of the Rehabilitation act of 1973 which mandates reasonable accommodations be provided for qualified students with disabilities. If you have a disability and may require some type of instructional and/or examination accommodation, please contact me early in the semester so that I can provide or facilitate in providing accommodation you may need. If you have not already done so, you will need to register with the Center for Access-Ability Resources (CAAR), the designated office on campus to provide services and administer exams with accommodations for students with disabilities. The CAAR office is located on the 4th floor of the University Health Services building (815-753-1303). I look forward to talking with you soon to learn how I may be helpful in enhancing your academic success in this course.
# Readings Schedule for Math 510  
**Fall 2004**

August/September

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 1       | Aug. 30  | Overview of the course  
Brief overview of history of mathematics education.  
Addenda series |
Eric Document ED228046.  
*Arithmetic Teacher, 3,* 311-316.  
Read Chapters 1, 2, and 8.  
Read Standards for grades 6–8.  


**October Readings Schedule for Math 510**


November Readings Schedule for Math 510

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Topic</th>
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</thead>
</table>


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National Center for Education Statistics. Teaching mathematics in the seven countries: Results from the TIMMS 1999 Video, pp. 1-12.


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**December Readings Schedule for Math 510**


