GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT
ELEMENTARY/SECONDARY EDUCATION

EDCI 572
Methods of Teaching Mathematics in the Secondary School
Fall 2005
Tuesdays, 7:20-10:00 p.m.

Instructor:
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Home phone: 540-349-8384
Cell phone: 540-270-9024
Office hours: By appointment
Email address: pkridler@gmu.edu

COURSE DESCRIPTION:
A. Prerequisite or co-requisite - EDUC 522
B. Covers curricula, current issues, and research literature in secondary school mathematics.
   Emphasis is on developing different styles of teaching. Field experience is required for those
   seeking initial teacher licensure.

NATURE OF COURSE DELIVERY:
Class discussion, small-group work, student presentations, blackboard communication and lecture.

STUDENT OUTCOMES:
This course is designed to enable pre-service and provisionally-licensed secondary mathematics teachers to:
1. Develop understanding of students’ mathematical learning and development through
   analyzing students’ thinking and/or work.
2. Develop understanding of curriculum in context through assessing students’ work,
   mathematics problems and/or texts.
3. Develop understanding of teaching through analyzing classroom interactions and the
   interplay among mathematics, classroom tasks, teaching, and students’ ways of thinking and
   learning.
4. Develop understanding of the scope and significance of secondary school mathematics
   through an examination of state and national standards and mathematics education research.
5. Develop professional dispositions for teaching through the demonstration of professional
   attitudes and work habits as well as the identification of professional organizations and
   professional development resources.
6. Continue learning mathematics, especially in ways that promote inquiry and investigation.

PROFESSIONAL STANDARDS:
National Council of Teachers of Mathematics (NCTM)
REQUIRED TEXTS & MATERIALS:


Note that the NCTM *Principles and Standards* are available for reading on-line at [http://standards.nctm.org/](http://standards.nctm.org/). They may also be purchased from that web-site in book form, as a PDF file, or on a CD-ROM.


Additional readings in course packet and available on e-reserves in the library as noted in course schedule.

COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENT, AND EVALUATION CRITERIA:

A. Requirements

Successful completion of this course requires the following:

1. A commitment to participation in class discussions and activities.

   The quality of this course depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking, leading discussions about selected mathematics problems, and sharing with the class the products of various writing, reflection, lesson planning, and field experience assignments. The expectations, demands and workload of this course are professional and high therefore attendance is mandatory.

2. A commitment to reading reflectively and critically the assigned readings.

   The readings will be used to provide a framework and coherent theme to the course content. Students are expected to participate in weekly reflective discussions on the assigned readings and/or complete additional assignments related to the week’s discussion.
3. **A commitment to attending and taking active part in 15 hours of classroom fieldwork.**

Experience of and participation in a real classroom is essential to bridging the gap between educational theory and practice. Your field experience will provide a basis for classroom discussion and reflective writing assignments. In addition, you will complete a final report about your experiences and observations.

**B. Performance-Based Assessments**

1. **A reflective “mathematical autobiography” and statement of your own philosophy of mathematics education.**

How you teach is inseparable from what you believe about mathematics, learning, and teaching. This assignment is intended to bring to light your educational and other personal experiences that influence your expectations and understanding of mathematics, teaching and learning.

2. **Clinical interview with a student, or if necessary, an adult about a carefully chosen problem or activity in mathematics.**

Effective teaching requires a keen awareness of how and what your students are thinking and understanding. The experience of conducting a clinical interview is intended to increase your awareness of the forms of questioning and engagement that offer insight into the thinking of your students.

3. **Unit plan of your choice appropriate for the secondary mathematics curriculum. At the end of the semester, you will present and share your entire unit and plans with your classmates.**

This assignment is the second gateway students are required to pass in the secondary education program. A “methods” course is not intended to offer a collection of lessons and activities that are ready-made for the classroom. Professional teachers must develop their own skills in critically choosing, planning, and presenting lessons appropriate for their classroom needs. This assignment lies closest to the core of what teachers do on a daily basis, and it will be evaluated with attention to your progress in developing these skills.

4. **Textbook analysis of curriculum materials used in secondary mathematics classrooms.**

Textbooks and curriculum play a significant role in mathematics teaching particularly at the secondary level. Textbooks are also an area of debate within mathematics education. The goal of this assignment is to have students critically examine the types of textbooks available and the purpose of textbooks in the mathematics classroom for teachers and students.

5. **Presentation of a mathematics problem-activity to the class with a mathematical discussion about the problem, its significant mathematics, and its historical foundations. (Each student will do this once during the semester.)**

These activities are intended to keep us focused regularly on mathematics, and to highlight on an
ongoing basis effective means of engaging students (in this case, one another) in discussions of mathematics. Leading such discussions offers you a “mini-teaching experience” without excessive lesson planning, and the problems themselves will often pave the way for insights concerning the complexity of otherwise simple mathematics.


This final report is actually a collection of specific reports (formats to be provided) on your field experiences. It is intended to be a means of tying together in-class discussions with your field observations. A brief statement of your philosophy of mathematics education is a final indication of “where you are” as you end the semester. The formulation of such a statement should be useful as you interview for teaching positions.

7. Additional assignments related to the week’s discussion. These include additional lesson plans, assessment activities, and mathematics problems.

While this is, in fact, a demanding course, assignments are scheduled in such a way that the workload remains more or less constant, assuming your commitment remains equally constant. Each week you have a reading assignment and some additional activity or short writing assignment to prepare. The four larger projects (the autobiography, the clinical interview, the unit and lesson plans, and the final field report) are spaced at intervals of about four weeks apart.

There are no tests or exams in this course. In place of a final exam, we will use the final exam day for presentations in class.

C. Criteria for evaluation

The performance-based assessments listed above will be evaluated and weighted in your final grade according to the following point scale:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Autobiography and Philosophy Statement</td>
<td>100</td>
</tr>
<tr>
<td>Clinical Interview</td>
<td>100</td>
</tr>
<tr>
<td>Unit Plan Assignment/Presentation</td>
<td>200</td>
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<tr>
<td>Textbook Analysis</td>
<td>50</td>
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<tr>
<td>Final Report and Philosophy Statement</td>
<td>50</td>
</tr>
<tr>
<td>Leading of math problem discussion</td>
<td>50</td>
</tr>
<tr>
<td>Additional lesson plans and assignments</td>
<td>200</td>
</tr>
<tr>
<td>Participation and preparation</td>
<td>100</td>
</tr>
<tr>
<td>Satisfactory completion of fieldwork</td>
<td>150</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000</strong></td>
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Fall 2005
Policy on Late Work/Incompletes:

All assignments should be completed as shown in the course schedule and/or as discussed in class. If arranged with the instructor, late work will be accepted the week after it is due with a 10% penalty.

If circumstances warrant, a written request for an incomplete must be provided to the instructor for approval prior to the course final examination date. Requests are accepted at the instructor’s discretion, provided your reasons are justified and that a major percentage of your work has already been completed. Your written request should be regarded as a contract between you and the instructor and must specify the date for completion of work. This date must be at least two weeks prior to the university deadline for changing incompletes to letter grades.

D. Grading Scale:

A: 90 – 100   B: 80 – 89   C: 70 – 79   F: Below 70

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS:
The Graduate School of Education (GSE) expects that all students abide by the following:

Students are expected to exhibit professional behavior and dispositions. See gse.gmu.edu for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#TOC_H12 for the full honor code.

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

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 or call 703-993-2474 to access the DRC.
TENTATIVE COURSE SCHEDULE

This course schedule is subject to change at the discretion of the instructor. All changes will be announced in class. Readings assigned will be discussed at the class with which they are listed.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment</th>
<th>Other Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/30</td>
<td>Introduction to course and standards</td>
<td>NCTM &amp; VA Standards</td>
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<tr>
<td></td>
<td></td>
<td>(discussed in class)</td>
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<tr>
<td>2</td>
<td>9/6</td>
<td>Introduction to curriculum, units, &amp; lessons.</td>
<td>NCTM &amp; VA Standards</td>
<td>Standards-Based Activity</td>
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<td></td>
<td></td>
<td>Cangelosi, Chapters 1 &amp; 4</td>
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<td></td>
<td></td>
<td>Cangelosi, Chapter 5</td>
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<tr>
<td>4</td>
<td>9/20</td>
<td>The complexity of mathematical knowing</td>
<td>Ma (1999) (P)</td>
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<td></td>
<td></td>
<td>Henningsen &amp; Stein (2002).</td>
<td></td>
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<tr>
<td>5</td>
<td>9/27</td>
<td>Lesson planning</td>
<td>Lampert (2002) (P)</td>
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<td></td>
<td></td>
<td>Hiebert et al. (1997) Chap. 2 (P)</td>
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<td>6</td>
<td>10/4</td>
<td>Algebraic thinking</td>
<td>Wagner (1983) (P)</td>
<td>Clinical Interview</td>
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<td></td>
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<td>Kazemi &amp; Stipek (2001) (E)</td>
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<td>7</td>
<td>10/11</td>
<td>NO CLASS</td>
<td>Columbus Day Recess</td>
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<tr>
<td>8</td>
<td>10/18</td>
<td>Ongoing assessment</td>
<td>Cangelosi (2003) Chapter 9</td>
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<tr>
<td>9</td>
<td>10/25</td>
<td>Community of practice</td>
<td>Lampert (1990) (E)</td>
<td>Textbook Analysis</td>
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<tr>
<td>10</td>
<td>11/1</td>
<td>Creativity &amp; transfer</td>
<td>Bransford et al. (2000).</td>
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<td></td>
<td></td>
<td>Chapter 3 (P)</td>
<td>Cangelosi (2003). Chapter 8</td>
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<td>Cangelosi (2003). Chapter 8</td>
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<tr>
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<td></td>
<td>Clements (2003) (P)</td>
<td></td>
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<tr>
<td>12</td>
<td>11/15</td>
<td>Technology</td>
<td>(E)Cangelosi (2003). Chapter 10</td>
<td>Unit Plan</td>
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<td></td>
<td></td>
<td></td>
<td>Doerr &amp; Zangor (2001) (E)</td>
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<td>13</td>
<td>11/22</td>
<td>TBA</td>
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<td>14</td>
<td>11/29</td>
<td>Educating all students</td>
<td>Ladson-Billings (1995) (P)</td>
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<td></td>
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<td>Schoenfeld (2002)</td>
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<td>15</td>
<td>12/6</td>
<td>Unit Plan Presentations</td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>12/13</td>
<td>Unit Plan Presentations</td>
<td></td>
<td>Final field reports and statement of philosophy</td>
</tr>
</tbody>
</table>

Note: The syllabus, content and materials for this course have been designed in collaboration with Margret Hjalmarson at George Mason University, Joseph Wagner at Xavier University and Megan Staples at Purdue University.
ADDITIONAL READINGS


