GEORGE MASON UNIVERSITY
Graduate School of Education
Mathematics Education Leadership

Course Title: Mathematics Education Curriculum Design and Evaluation
Program Code: EDCI 856 001 (3 credits)
Fall 2005/Spring 2006

Instructor: Dr. Patricia Moyer-Packenham   Office Hours: Tuesday 3:00-5:00 PM
Office Phone: (703) 993-3926          Office Hours: Thursday 1:00-3:00 PM
Office: 207A Commerce II Bldg.        Class Meets: 2nd Saturday Monthly
Email: pmoyer@gmu.edu          Location: A412 Robinson Hall

I. Course Description

Yearlong seminar for Ph.D. students in the Mathematics Education Leadership cohort program. Students engage in research, analysis, design and evaluation of school mathematics curricula. 
Prerequisite: Admission to the Mathematics Education Leadership Ph.D. Program

II. Student Outcomes

At the conclusion of this course, students should be able to:
A. Identify standards-based school mathematics curriculum projects; Analyze key characteristics of outstanding curriculum materials for school mathematics.
B. Examine learning theories that have been influential in mathematics education and identify ways those theories have been translated into curriculum materials and strategies for teaching.
C. Evaluate research on NSF-funded and commercially developed school mathematics curriculum materials to make informed choices.
D. Present and lead an in-depth discussion on a set of school mathematics curriculum materials.
E. Work as a member of a collaborative team to design school-based mathematics curriculum materials based on key design principles.

III. Relationship to Program Goals and Professional Organization

EDCI 856 is designed to enable mathematics education leaders to evaluate and develop mathematics curriculum materials appropriate for school mathematics. The course was developed according to the joint position statement of the Association of Mathematics Teacher Educators (AMTE) and the National Council of Teachers of Mathematics (NCTM) on Principles to Guide the Design and Implementation of Doctoral Programs in Mathematics Education.

This position statement indicates that the core knowledge expectations for doctoral study in mathematics education include:

• Design effective curricula and learning environments to facilitate the development of deep and connected mathematical understanding,
• Lead curriculum design, analysis and evaluation efforts,
• Study different strands of curricula,
• Compare international curricula,
• Demonstrate knowledge of historical, social, political, and economic factors impacting mathematics education, and
• Review studies of mathematical concepts across grade levels.
IV. Nature of Course Delivery

The delivery of this course combines methods of lecture, discussion, independent study/research, student presentation, and writing.

V. Texts and Readings

Required Books & Electronic Resources

Center for the Study of Mathematics Curriculum – (http://www.mathcurriculumcenter.org/Resources.html)
NSF-Sponsored Curriculum (online resource). *The K-12 Mathematics Curriculum Center*. (www2.edc.org/mcc/currucula.asp)

Required Articles


Additional resources

Eisenhower National Clearinghouse. *Professional development by your own design*, online site (http://www.enc.org/professional/).
VI. Course Requirements and Assignments

The assignments across the semesters are intended to develop skills in mathematics curriculum analysis, design and evaluation. Students conduct in-depth study of mathematics curriculum materials, investigate NSF-funded mathematics curriculum projects, examine research on mathematics curriculum projects, and present an evaluation of their findings. All assignments are to be completed on time so that class members might benefit from the expertise and contributions of their colleagues.

A. Curriculum Evaluation and Persuasive Argument Presentation (20%)

Conduct a review of three school mathematics curriculum projects (including standards-based, supplemental, NSF-supported, or other curriculum materials such as Navigations, DMI, CGI, Math Solutions, Saxon, etc.). One of the three projects selected for this assignment can also be used for the NSF–Funded Curriculum Review and Presentation assignment listed below (Item B.).

Identify characteristics that curriculum projects share and those that make each project unique. Identify a purpose and audience for the use of the curriculum materials. Develop and utilize selection criteria based on your readings that will be used to select one of the curriculum projects over the other two projects. Use your text (Goldsmith, Mark, & Kantrov, 2000) as a resource in the selection process and use the sample questions on pgs. 65-67 to develop your own selection questionnaire. Use this questionnaire to evaluate each of the three projects.

Part 1 – Written Summary Report

Prepare a written summary of your review that includes: (1) information about each of the three curriculum projects, (2) the questionnaire you developed and used for the selection process of the “best” curriculum for your purpose and audience, (3) a summary that argues for the curriculum you have selected as the “best,” and (4) a 350-450 prepared statement that makes a persuasive argument for the curriculum you selected. The written summary report of your review should be 10-14 pages in length (double-spaced type). The selection questionnaire and the 350-450 prepared statement should appear as two additional appendices to the written summary document.

Part 2 – Persuasive Argument Presentation

Present the written persuasive argument during the Mock School Board class session. The purpose of this portion of the assignment is to prepare mathematics leaders for situations where they are required to prepare a concise presentation on a set of curriculum materials that will persuade an audience to agree with their perspective. The prepared statement should be between 350-450 words. You will read this statement to the class and the class will have the opportunity to refute the points you make in your statement.

B. NSF–Funded Curriculum – Written Review & Presentation Assignments (30%)

Select one mathematics education curriculum project funded by the National Science Foundation (NSF). NSF-Sponsored Curriculum (online resource). The K-12 Mathematics Curriculum Center. (www2.edc.org/mcc/curricula.asp)

Part 1 – Discussion Leadership

The purpose of this portion of the assignment is to develop your leadership skills in initiating and focusing a discussion on mathematics curriculum and to enhance your knowledge base of research on curriculum. Select one chapter from Standards-based school mathematics curricula: What are they? What do students learn? (Senk & Thompson, 2003). This chapter selection will be the same as your selection of the NSF-Funded Curriculum for the written review (in Part 2). Lead a discussion on this chapter during a class session (20-30 minutes). Use PowerPoint to prepare key points and questions for discussion. Remember that the other class members have also read the chapter and this should be a discussion, not a lecture.
Part 2 – Written Review
Conduct an in-depth analysis of one NSF-funded curriculum. Research and evaluate the NSF-funded project on a variety of attributes (which may include scope and sequence, relationship to NCTM Standards, content, design, etc.). You must include a discussion of the research that has been conducted on the curriculum in this written review. Use evaluation indicators to identify key characteristics of high quality materials that are exemplified by the curriculum selected. Prepare a written review of the NSF-funded curriculum materials. Describe the key features of the curriculum. Identify areas of strengths and weakness in the curriculum materials and suggested improvements for the designer (approx. 8-12 pages in length, double-spaced type, and a minimum of 10 citations on curriculum required).

Part 3 – Sample Curriculum Activity Presentation
Examine several individual lessons and units from one NSF-funded curriculum. Select one specific lesson or activity from the materials that you believe demonstrates the key characteristics of the curriculum. The lesson you select to share should show others what a typical lesson is like when using this curriculum. Use PowerPoint and other media and materials to lead the class in a sample lesson from the curriculum materials. (20-30 minutes)

C. Curriculum Design Project (35%)

Part 1 - Design
Design a school mathematics curriculum project with a team. There are some common characteristics of high quality curriculum materials in mathematics. The purpose of this assignment is to integrate your knowledge of these design characteristics into the creation of a curriculum development project. As a member of the project team, you will help to set goals for the project and identify the audience and their needs. Each member of the team will design 5 units of delivery within the project. These units will follow a template to ensure that the materials are cohesive. (See Navigations materials for examples of this type of template format.)

Part 2 – Implementation
There is increasing demand to assess the value of curriculum materials in mathematics. Designing and implementing curriculum that achieves its goals is the desired outcome of successful projects. During this part of the project, you or a colleague that you select should implement the curriculum materials you have designed with a small group or a whole classroom of students. The implementation of the curriculum is an important time to gather feedback and information on the effectiveness of the materials you have developed. Following this implementation, revise the materials based on what you learned.

Part 3 – Evaluation
Another part of the curriculum design process is an external evaluation of the materials. During this part of the project, other professionals will examine your materials and provide feedback for you on the units you have created. This evaluation feedback should be used to contribute to continuous improvement of the materials. After receiving feedback, revise the materials based on that feedback and submit the final design units to your instructor.

D. Discussion Participation (5%)
During each class session, students participate in discussions of readings and student presentations and provide written feedback to class members. Students are evaluated on their contributions to these discussions.

If you are absent from a class session where any readings are discussed, you are required to provide your instructor with a written summary and analysis of the readings.
E. **Curriculum Vita** (10%; 5% fall, 5% spring)
Prepare a copy of your current curriculum vita during the fall session of the course. Update your vita throughout the academic year. Note areas of experience and expertise that you would like to enhance during the academic year. Submit a *revised and highlighted* copy of your vita during the final class session indicating areas where you have demonstrated professional growth during the year.

**VII. Evaluation Schema**

**Determination of the Final Grade:**

<table>
<thead>
<tr>
<th>Graduate Grading Scale</th>
<th>A 93%-100%</th>
<th>B+ 87%-89%</th>
<th>C 70%-79%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A- 90%-92%</td>
<td>B 80%-86%</td>
<td>F Below 70%</td>
<td></td>
</tr>
</tbody>
</table>

**VIII. Course Schedule**

Class meets 10:00 – 3:00 PM, Saturdays

**FALL 2005 – SPRING 2006 CALENDAR**

<table>
<thead>
<tr>
<th>DATE</th>
<th>CLASS SESSION TOPICS</th>
<th>READINGS &amp; ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 10</td>
<td>What is a Standards-Based Curriculum?</td>
<td>Goldsmith (Ch# 1-8)</td>
</tr>
<tr>
<td>Saturday</td>
<td>The Curriculum Selection Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mathematics Curriculum Issues</td>
<td>Senk &amp; Thompson (Ch# 1)</td>
</tr>
<tr>
<td></td>
<td>Curriculum Review &amp; Electronic Resources (laptops)</td>
<td></td>
</tr>
<tr>
<td>October 9</td>
<td>NSF Elementary Curriculum Projects</td>
<td>Senk &amp; Thompson (Ch# 2-4) <em>(Math Trailblazers &amp; Everyday Math)</em> <em>(B1)</em></td>
</tr>
<tr>
<td>Saturday</td>
<td>Focus on the NCTM (2000) Principles</td>
<td>NCTM Principles (pp.3-27)</td>
</tr>
<tr>
<td></td>
<td>The Standards Movement in Math Education</td>
<td>Read #1/Ferrini-Mundy</td>
</tr>
<tr>
<td></td>
<td>Implementing Standards and Curricular Controversy</td>
<td>Read #3/Jacob; Read #4/Reys; Read #6/Trafton</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curriculum Vita DUE <em>(E)</em></td>
</tr>
<tr>
<td>November 12</td>
<td>NSF Elementary Curriculum Projects</td>
<td>Senk &amp; Thompson (Ch# 5-7) <em>(Investigations, Number Power, &amp; Elem Commentary)</em> <em>(B1)</em></td>
</tr>
<tr>
<td>Saturday</td>
<td>Focus on the NCTM (2000) Standards</td>
<td>NCTM Standards (pp.28-71)</td>
</tr>
<tr>
<td></td>
<td>Re-Thinking Curriculum Design; Curriculum Research</td>
<td>Read #2/Griffin &amp; Case; Read #5/Schoenfeld</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curr. Activity Presentations <em>(B3)</em></td>
</tr>
<tr>
<td>December 10</td>
<td>NSF Middle Grades Curriculum Projects</td>
<td>Senk &amp; Thomp (Ch# 8-12) <em>(Connected Math, Math in Context, &amp; MATH Thematics)</em> <em>(B1)</em></td>
</tr>
<tr>
<td>Saturday</td>
<td>Frameworks for Evaluating Curricular Effectiveness</td>
<td>NRC (Ch# 1-3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curr. Activity Presentations <em>(B3)</em></td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Resource Content</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>January 14</td>
<td>Winter Break</td>
<td>Senk &amp; Thompson (Ch# 13-16) (Core-Plus, Interactive, &amp; MATH Connections) (B1)</td>
</tr>
<tr>
<td>February 11</td>
<td>NSF High School Curriculum Projects</td>
<td>NRC (Ch# 4)</td>
</tr>
<tr>
<td></td>
<td>Curriculum Content Analysis</td>
<td>Curriculum Design Projects DUE (for external evaluation) (C1 &amp; 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curr. Activity Presentations (B3)</td>
</tr>
<tr>
<td>March 11</td>
<td>NSF High School Curriculum Projects</td>
<td>Senk &amp; Thompson (Ch# 17-19) (SIMMS &amp; UCSMP) (B1)</td>
</tr>
<tr>
<td></td>
<td>Curriculum Comparative Studies</td>
<td>NRC (Ch# 5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Written Review of NSF Curr DUE (B2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curr. Activity Presentations (B3)</td>
</tr>
<tr>
<td>April 8 (NO)</td>
<td>AERA Conference Make-Up Class</td>
<td>NRC (Ch# 6-7)</td>
</tr>
<tr>
<td>April 29</td>
<td></td>
<td>Written/Persuasive Arguments DUE (A1 &amp; 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curr. Activity Presentations (B3)</td>
</tr>
<tr>
<td>May 13</td>
<td>What Works?</td>
<td>Senk &amp; Thompson (Ch# 20)</td>
</tr>
<tr>
<td></td>
<td>Curriculum Implementation</td>
<td>Goldsmith (Ch# 9-12)</td>
</tr>
<tr>
<td></td>
<td>Networking &amp; Leadership in Mathematics</td>
<td>Revised Curriculum Vita DUE (E)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curriculum Design Projects – Revisions DUE (C3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curr. Activity Presentations (B3)</td>
</tr>
</tbody>
</table>

**IX. UNIVERSITY POLICIES**

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

**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. Detailed information on these policies is available in the GMU Student Handbook, the University Catalog, of the GMU website (www.gmu.edu).

**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. Applicants for admission and students requiring specific accommodations for a disability should contact the Disability Resource Center at 993-2474, or the University Equity Office at 993-8730.

**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).