GEORGE MASON UNIVERSITY
Graduate Course Inventory Form
(Prepare and forward with your course proposal to the Graduate Council)

Local Unit: Graduate School of Education
Grad Council Approval Date:

Course Abbrev.: EDCI
Course Number: 858

Full Course Title: Mathematics Education Research Design and Evaluation (K-8)

Abbrev. Course Title (max. 24 Characters): Mth Educ Res Dsgn Eval

Credit Hours: 3
Program of Record: Mathematics Education Leadership

Submitted by: Patricia S. Moyer-Packenham Date: 4/1/03

Repeatable for Credit?
N=Yes, not within same term Up to ______ hours
T=Yes, within the same term Up to ______ hours
N=Cannot be repeated for credit

Activity Code: _____ X _____ LEC - Lecture, _____ LAB - Lab, _____ RCT - Recitation,
_____ STU - Studio, _____ IND - Independent Study, _____ INT - Internship

Catalog Credit Format: _3__3:_0__ Course Level: GF (500-600) ___ GA (700+) ___X___

Grade Type: ___GT____GR: graduate grading, normal (A, A-, B+, B, C, F, IN, AB)

Maximum Enrollment: ___10_______

Submit for New courses - First term to be offered: ____Fall 2007_____

Prerequisites: Admission to the Mathematics Education Leadership Ph.D. Program
Corequisites:

Catalog Description for the course proposal (35 words or less):
Yearlong seminar for Ph.D. students in the Mathematics Education Leadership cohort program. Students review methods of research appropriate for mathematics education settings and develop a theoretical framework and action plan for conducting a research project.

Submit for Modified or Deleted courses as appropriate effective:
Last Term Offered _____ Previous Course Abbreviation _____ Previous Number _____

Description of modification

Approval Signatures
Dept/Prog _____________________________________ Date _________

College Committee ______________________________ Date _________

Graduate Council Representative ______________________ Date _________
**Catalog description of course:**
Departmental code or prefix, number, title of course and credit hours; prerequisites; and description of course as it will appear in the catalog. Note that course descriptions are limited to approximately 35 words in the Graduate Catalog.

**EDCI 858 Mathematics Education Research Design and Evaluation, K-8 (3:3:0).** Prerequisite: Admission to the Mathematics Education Leadership Ph.D. program. Yearlong seminar for Ph.D. students in the Mathematics Education Leadership cohort program. Students review methods of research appropriate for mathematics education settings and develop a theoretical framework and action plan for conducting a research project.

For course modifications, describe the changes made to the course and justification for those changes.

**Approval from other units:**
Please list those units outside of your own who may be affected by these changes in the course. Each of these units must approve this change prior to its being submitted to the Graduate council for approval.

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<thead>
<tr>
<th>Unit</th>
<th>Unit head</th>
<th>Date</th>
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Graduate Council approval ______________________________________

Graduate Council representative ___________________________________ Date _______

Attach copy of school/college/institute course proposal form or modification memo showing approval date and background data on course.

**GEORGE MASON UNIVERSITY**
Graduate School of Education

**Course Title:** Mathematics Education Research Design and Evaluation (K-8)
**Program Code:** EDCI 858 001 (3 credits)
I. Course Description

Yearlong seminar for Ph.D. students in the Mathematics Education Leadership cohort program. Students review methods of research appropriate for mathematics education settings and develop a theoretical framework and action plan for conducting a research project.

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. Interpret, critique and synthesize quantitative and qualitative mathematics education research.
B. Develop and articulate a theoretical framework for the design of a research study in mathematics education.
C. Develop an action plan for the design of a quantitative or qualitative project choosing from among various research methodologies.
D. Defend a research action plan to an audience of peers.

III. Relationship to Program Goals and Professional Organization

EDCI 858 is designed to enable mathematics education leaders to develop and articulate a theoretical framework for a research project and develop and defend a research action plan for a project in mathematics education. 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
• Knowledge of historical, social, political, and economic factors impacting mathematics education,
• Critique and synthesize research results,
• Conceptualize and conduct research that advances the field’s understanding of mathematics learning and teaching,
• Communicate research results clearly to a variety of audiences,
• Choose among multiple research methodologies,
• Demonstrate expertise in both quantitative and qualitative research methodologies,
• Design studies and analysis techniques appropriate to the question under study, and
• Read, interpret and conduct research.

IV. Texts and Readings


Selected articles

Additional resources
V. Course Requirements and Assignments

The assignments across the semester are intended to develop skills in interpreting, designing, and reporting research findings in mathematics education. Students review methods of research appropriate for mathematics settings and develop a theoretical framework and action plan for conducting a research project. All assignments are to be completed on time so that class members might benefit from the expertise and contributions of their colleagues.

A. Research Methods Critiques (10% of the course)

Mathematics education research has contributed greatly to the teaching and learning of mathematics in K-12 school settings. There are many research methodologies that have been used to investigate questions about mathematics teaching and learning. This assignment supports the development of your knowledge base of these methods.

Select three research studies that use different methods for collecting and analyzing data on mathematics teaching and learning. Use APA format to cite the articles. Write a critique of the three articles focusing on an overview of the article, the educational significance of the study, strengths and weaknesses of the research and how it was presented (including any limitations of the design), and any recommendations for improving the research design and methodology or the presentation of the research. Be sure to pay particular attention to the research question used and what methods were employed to answer that question. Present your critique during a class session. Provide a handout that summarizes the three research methods for members of the class.

B. Theoretical Framework (20% of the course)

Schools operate in a social context that is influenced by a variety of historical, social, political, and economic factors. Mathematics education is not immune to the forces shaping education in general, and it is important that mathematics educators understand these forces and how they work. Knowledge of this history provides a valuable lens to interpret, understand, and act upon these areas and to participate in the process of improvement. Your readings on these influences and learning theories provide a foundation for the development of your theoretical framework for research.

Develop and articulate a theoretical framework for teaching and learning mathematics that provides a foundation for a small research project. Use a variety of primary sources to support the development of your framework (minimum of 10 references). Describe how this framework shapes your thinking about research you may conduct in the future in mathematics education. Use Powerpoint and other forms of technology to prepare and present your framework during a class session.

C. Research Action Plan (30% of the course)

A research action plan is an outline for an empirical plan of investigation. It is designed to answer a specific research problem or question. When writing the research plan, students are required to read broadly in the field of mathematics education and select a particular area of interest; read in-depth in the focus area of interest in mathematics education and develop a thorough knowledge of the literature on one specific topic; formulate a question or problem of interest that has not been researched in the literature; write a critical analysis of the previous studies (going beyond reporting simply what others have done and indicating the significance of your question or problem to the current body of literature in mathematics education); and develop a persuasive argument and plan of action for answering the research question.
D. Presentation and Defense of Research Action Plan (30% of the course)

Students will develop the specific content knowledge and background to present a research action plan in an open forum and defend the plan using a persuasive argument. Students are required to present a focused area of research demonstrating the depth of their knowledge of the literature in the area; discuss their theoretical framework in the particular area of interest and how it relates to the research question; present a research question or problem; develop a persuasive argument showing that the question or problem is of significance to the field; describe an empirical research plan of action for investigating the question or problem; defend the proposal to an audience of peers; and utilize technology to prepare and make the presentation (beyond basic overhead transparencies, i.e. – PowerPoint, hyperstudio, multi-media, etc.).

E. Discussion Record (10% of course grade)

During each class session, students participate in discussions of readings and student presentations and provide written feedback to class members. A discussion record is maintained during each of these class sessions documenting the participation of each class member. Students are graded on their contributions to these discussions and on their written evaluation feedback for class members.

Attendance. It is your responsibility to attend all class sessions and to be on time for each class session. 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/email.

VI. Possible Evaluation Schema

Determination of the Final Grade
Graduate Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93%-100%</td>
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<tr>
<td>A-</td>
<td>90%-92%</td>
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<tr>
<td>B+</td>
<td>87%-89%</td>
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<tr>
<td>B</td>
<td>80%-86%</td>
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<tr>
<td>C</td>
<td>70%-7%</td>
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<td>F</td>
<td>Below 70%</td>
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The university has a policy that requests students to turn off pagers and cell phones before class begins.

VII. Course Schedule

Class meets 10 00 – 2 30 PM, Saturdays

<table>
<thead>
<tr>
<th>Week – Class</th>
<th>Topic and Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Reading, Interpreting and Critiquing Mathematics Educational Studies Hiebert article + selected articles</td>
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<tr>
<td>2</td>
<td>Research Methods and Critical Issues Impacting Mathematics Education Research (Kelly &amp; Lesh – Ch #1-5)</td>
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<tr>
<td>3</td>
<td>A Theoretical Framework for Research Instruments &amp; Methods (Kelly &amp; Lesh – Ch #6-8)</td>
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<tr>
<td>4</td>
<td>Quantitative and Qualitative Research in Mathematics Education Developing an Action Plan for Research (Kelly &amp; Lesh – Ch #2 -32) (English, Handbook of Intl’ Research – selected chapters)</td>
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<tr>
<td>5</td>
<td>Choosing Among Multiple Research Methodologies – Teaching Experiments (Kelly &amp; Lesh – Ch # -13)</td>
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<td>6</td>
<td>Choosing Among Multiple Research Methodologies – Classroom-Based Research (Kelly &amp; Lesh – Ch #14-18)</td>
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<tr>
<td>7</td>
<td>Critiquing and Synthesizing Research – Clinical Methods (Kelly &amp; Lesh – Ch #1 -24)</td>
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<td>8</td>
<td>Critiquing and Synthesizing Research – Curriculum Design as Research (Kelly &amp; Lesh – Ch #25-28)</td>
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<td>Presentation and Defense of Action Research Plan</td>
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<td>10</td>
<td>Presentation and Defense of Action Research Plan</td>
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