GRED 569 – Fall 2008   Instructor: Donald Straight
Class Time: TTh 9:20-10:50 *(unusual times!)*   Office: Satterlee Hall 216A
Classroom: Satterlee 301   Office Hours: Mondays 2:00 – 4:30 p.m.
Phone: 267-2553 (office)   Tu/Th 11 a.m. – 12 p.m.
E-mail: straigdc@potsdam.edu   *or by appointment*

GRED 569 Teaching Mathematics in Secondary Schools

Teaching Mathematics in Secondary School is a course designed to prepare students to teach mathematical concepts and skills in grades 7-12. The course is aimed at developing knowledge and understanding of current trends in mathematics education with a particular focus on the middle and secondary school (grades 7-12) mathematics instruction. Drawing on recent research and the NCTM and New York State standards, pre-service teachers will learn how to help students in middle and secondary schools develop their mathematics skills and abilities through understanding and practice. A particular focus of this course will be on theories of student learning, teaching strategies, classroom management and assessment. Students will be introduced to current issues in mathematics education and will be expected to develop a personal philosophy of teaching and learning mathematics. They will learn to develop lessons that meet the New York State Learning Standards for Mathematics, address the needs of diverse learners, and make appropriate use of technology. A practicum in local secondary schools will provide students an opportunity to experience and participate in the school mathematics environment and to apply the concepts learned.

SUNY Potsdam Education Unit Conceptual Framework
A Tradition of Excellence: Preparing Creative and Reflective Practitioners

This course supports the SUNY Potsdam Education Conceptual Framework in several ways. First, through experiences provided in this course students will continue to develop as "Well-Educated Citizens" by modeling the skills, attitudes and values of inquiry appropriate for a mathematics teacher and by using technology appropriately. They will continue to develop as "Reflective Practitioners" by modeling inquiry, practice and reflection in their field experiences and journals; effectively using research-based models of curriculum, instruction, and assessment as they plan for instruction; create and teach lessons that meet the diverse learning needs of students; identify state learning standards that are related to their lessons; develop lessons that incorporate the appropriate use of technology; and develop lessons that promote inquiry, critical thinking, and problem solving. They will develop as "Principled Educators" by demonstrating professional behavior in their classes and in their field experiences; demonstrating appropriate integrity and competence for beginning level pre-service teachers; demonstrating the ability to work with 7-12 students and teachers; and show a comfort level with the changing world of middle/secondary classrooms and school systems.

Objectives

Students will:
- Reflect on the aims of mathematics instruction and the nature of mathematics and on one's role as a teacher of mathematics.
- Develop one's own philosophy for the teaching of mathematics.
- Demonstrate an understanding of contemporary theories of student mathematical learning.
- Demonstrate a familiarity with a variety of successful mathematics teaching strategies.
- Demonstrate a familiarity with a range of effective assessment techniques.
- Demonstrate the knowledge, skills, and dispositions needed to be a successful middle/secondary school mathematics teacher.
- Demonstrate strong communication and organizational skills by developing quality lesson plans, leading an effective microteaching lesson, and developing a comprehensive classroom management plan.
- Demonstrate the ability to select and frame mathematical tasks to engage students' interest and intellect.
- Demonstrate the ability to reflect on one's experiences in school classrooms by maintaining a journal.

Texts and Materials

Brahier, Daniel J. (2009) <u>Secondary and Middle School Mathematics</u>, Third Edition, Allyn and Bacon.

Johnson, David (1982) <u>Every Minute Counts: Making Your Math Class Work</u>, Palo Alto: Dale Seymour.

Chappell, Choppin and Salls (2004) <u>Empowering the Beginning Teacher of Mathematics in High School</u>, National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics (2000) <u>Principles and Standards for School Mathematics</u>, Reston, VA: NCTM. (Also available at http://standards.nctm.org)

Course reading materials (available on Blackboard)

Class handouts (to include the Cooney chapter and exercises – "Thinking About Being a Mathematics Teacher")

TaskStream on-line portfolio account (www.taskstream.com)

Evaluation:

Class Performance	10%
Class Assignments (includes classroom management plan	
and Cooney chapter exercises)	20%
Teaching Portfolio	15%
Micro-teaching	10%
Book Club Reports	5%
Final Exam	20%
Field practicum/journal	20%
Total	100%

Each of the above is described below.

Class Performance

All students are expected to attend and participate in class. You will be evaluated based on your willingness to participate in activities and discussions and your ability to ask questions that represent thoughtful reflection on the material presented and the readings. Good teachers must also be good colleagues. Thus you will also be assessed on how well you work with others. Are you respectful of the ideas of others? Are you a responsible team member? Note: You cannot participate if you are not in class.

Class performance rubric (out of 10 points):

10   Missed no more than one class. Was always prepared for class. Contributed in a positive manner to class discussions on a regular basis. Enthusiastically participated in class activities. Was respectful of the ideas of others. Encouraged others to participate.

8   Missed no more than two classes. Was always prepared for class. Contributed in a positive manner to class discussions on a regular basis. Enthusiastically participated in class activities. Was respectful of the ideas of others. Encouraged others to participate.

6   Missed no more than three classes. Was usually prepared for class. Made some contribution to class discussions on a regular basis. Participated in class activities. Was respectful of the ideas of others.

0   Missed more than three classes. Was seldom prepared for class. Did not contribute to class discussion or contributions were negative and/or disruptive. Took little or no interest in class activities. Was disrespectful of others.

Conceptual Framework Alignment: professional behavior, works well with others, takes responsibility for ones own actions.

Assignments

A number of assignments will be given during the semester, including the design of a classroom management plan. Assignments will demonstrate that preservice teachers are able to think clearly about school mathematics and methods of teaching the mathematics. Knowledge of school mathematics content will also be applied.

Students will write a Classroom Management Plan that will address ones conclusions related to a number of aspects of classroom practice, such as a seating plan, homework system, classroom rules, and attendance policy. Your classroom management plan will be presented to the class.

In addition, responses to the reflective problems and explorations from the Tom Cooney chapter "Thinking about being a Mathematics Teacher" will be collected on a regular basis. Reflections on personal growth related to philosophy of teaching mathematics and changes in pedagogical approaches to teaching mathematics are especially encouraged as a part of the Cooney responses.

Conceptual Framework Alignment: critically analyzes and solves problems, meets the diverse learning needs of all students, demonstrates knowledge of state standards, promotes inquiry, critical thinking and problem solving, effectively uses instructional technology, effectively uses research-based models of instruction and assessment, and models inquiry and reflection and develops as reflective practitioners.

Micro-teaching

Students will be asked to plan and micro-teach (with a small group) a portion of a mathematics lesson to the class. Such an assignment demonstrates the ability to develop a unit/lesson that meets the NYS Learning standards, uses appropriate materials and/or technology, plans for working with diverse students, and researches and uses a variety of resources. A specific rubric will be given for the microteaching assignment. More detail about this assignment will be provided as the time approaches.

Conceptual Framework Alignment: critically analyzes and solves problems, meets the diverse learning needs of all students, demonstrates knowledge of state standards, promotes inquiry, critical thinking and problem solving, effectively uses instructional technology, and effectively uses research-based models of instruction and assessment.

Teaching Portfolio

Students will continue the development of an electronic Professional Teaching Portfolio using *TaskStream*, one that documents their growth and achievement over time. Guidelines for portfolio development, aligned with the INTASC standards, will be distributed. Students are expected to purchase a *TaskStream* account (available at www.taskstream.com) to facilitate the creation of an electronic portfolio.

Conceptual Framework Alignment: critically analyzes and solves problems, meets the diverse learning needs of all students, demonstrates knowledge of state standards, promotes inquiry, critical thinking and problem solving, effectively uses instructional technology, and effectively uses research-based models of instruction and assessment.

Book Club Reports

Students will read at least one popular book related to mathematics or mathematics education and report on it to the rest of the class. The book should be one of the following: a popular treatment of mathematics itself, an examination of current issues in mathematics education, a description of an important person in mathematics, a book on the history of mathematics, or on another topic related to mathematics. A list of possible titles will be distributed. A brief written "book report" will also be submitted.

Conceptual Framework Alignment: critically analyzes and solves problems, promotes inquiry, critical thinking and problem solving, and develops as reflective practitioners.

Final Exam

A final examination will be based on the content covered in class, including class readings and discussions, and the homework sets.

Conceptual Framework Alignment: critically analyzes and solves problems and demonstrates knowledge of state standards.

Field Experience Practicum

Students will complete a 35 hour (or more, as necessary) practicum in a secondary school mathematics classroom. The Field Experience Guidelines handout describes the requirements for this practicum. Students should register for the field experience at www.potsdam.edu/educ/studteach.

Conceptual Framework Alignment: critically analyzes and solves problems, meets the diverse learning needs of all students, applies knowledge of state standards, promotes inquiry, critical thinking and problem solving, effectively uses instructional technology, effectively uses research-based models of instruction and assessment, models inquiry, practice and reflection, behaves in a professional manner, works well with others, takes responsibility for ones own actions, recognizes and respects ones on diversity and the diversity of others and fosters positive relationships with P-12 students, teachers and other school personnel.

GRED 569 Teaching Mathematics in Secondary Schools – Fall 2008 – Course Outline (subject to change)

Note: Readings and other assignments are due at the beginning of class on the dates indicated unless directed otherwise.

Month	Day	Topic/Activity	Readings	Assignments
Aug	26	Introduction to the course Review Course Syllabi		
	28	What is mathematics? What is mathematics for? (Why do we teach it?)	Devlin	Math Ed questionnaire
Sept	2	TIMSS video study	Stigler & Hiebert	Read Cooney pp. 1-5; Cooney reflective problems 1, 2 and 3; exploration 1
	4	TIMSS video study		TIMSS video questions
	9	Learning Theories	Battista, Brahier Ch. 3	Read Cooney pp. 5-13; Cooney explorations 2-7
	11	Learning Theories		
	16	Pedagogy – What makes a good math teacher? Models of effective teaching	Skemp, Prevost	Read Cooney pp. 13-14; Cooney reflective problem 4
	18	Assessment	Brahier Ch. 9, 10	
	23	Assessment Open tasks		Read Cooney 19-23; Cooney exploration 11 Assessment exercise
	25	Micro teaching		
	30	Micro teaching Planning for Field Experience (in class)		
Oct	2	Field Experience (first day)		
	7	Teaching strategies: Questioning techniques & cooperative learning *TaskStream* Portfolios	Brahier Ch. 7, 8 Richbart & Richbart, Davidson	

Oct	9	Field Experience		
	14	No class – fall recess		
	16	Field Experience		
	21	Classroom management	Johnson book, Kanold	
	23	Field Experience		
	28	Classroom management		
	30	Field Experience		
Nov	4	Reaching diverse learners	Rising, Furner & Duffy, Brahier Ch. 11	Read Cooney pp. 14-18; Cooney exploration 8, 9
	6	Field Experience *Note: AMTNYS Annual Conference November 6-8. 2008, Rye Brook, NY*		
	11	Responsibilities of a professional teacher	Brahier Ch. 12	
	13	Field Experience		
	18	What to expect in your first year of teaching Final teaching tips	DePaul, Purkey	Read Cooney pp. 23-25; Cooney reflective problems 5 and 6
	20	Field Experience		
	25	Class presentations – Management Plans		
	27	No class – Thanksgiving Break		
Dec	2	Class presentations – Management Plans		
	4	Field Experience (final visit)		
	11-17	Final Exams *Specific time and date to be announced*		

Bibliography

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Burke, M. and Curcio, F. (2000) *Learning Mathematics for a New Century. 2000 Yearbook*. Reston, VA: NCTM.

Cooney, T., Brown, S. and Dossey, J. et. al. (1999) *Mathematics, Pedagogy and Secondary Teacher Education*. Heinemann.

Davis, R. & Maher, C. (1993) *Schools, mathematics and the world of reality*. Boston: Allyn and Bacon.

Driscoll, M. (1999) *Fostering Algebraic Thinking: A guide for teachers grades 6-10*, Heinemann.

Easterday, K. (1999) *Activities for Junior High School and Middle School Mathematics (Second Edition)*. Reston, VA: NCTM.

Grouws, D. A. (1992) *Handbook of research on mathematics teaching and learning*, New York: Macmillan Publishing Company.

Ginsburg, H. (1989) *Children's arithmetic: How they learn it and how you teach it*. 2nd Ed. Austin, TX: Pro.Ed.

Hiebert, J. (1997) *Making Sense: Teaching and learning mathematics with understanding*. Heinemann.

Kinney, M. (1998) *The teaching and learning of algorithms in school mathematics. 1998 Yearbook*. Reston, VA. NCTM.

Leutzinger, L. (1998) *Mathematics in the Middle*. Reston, VA: NCTM.

Litwiller, B. (2002) *Making Sense of Fractions, Ratios, and Proportions. 2002 Yearbook*. Reston, VA: NCTM.

Ma, L. (1999) *Knowing and teaching elementary mathematics*. Mahwah, NJ: Lawrence Erlbaum Associates.

National Council of Teachers of Mathematics (1991) *Professional Standards for Teaching Mathematics*. Reston, VA: NCTM.

National Council of Teachers of Mathematics (1995) *Assessment standards for school mathematics*. Reston, VA: NCTM.

National Council of Teachers of Mathematics (2000) *NCTM Principles and Standards for School Mathematics*. Reston, VA: NCTM.

Owens, D. (1993) *Research ideas for the classroom: Middle grades mathematics*. Reston, VA: NCTM.

Stiff, L. (1999) *Developing mathematical reasoning in grades K-12. 1999 Yearbook*. Reston, VA. NCTM.

Stigler, J. and Hiebert, J. (1999) *The Teaching Gap: Best ideas from the World's Teachers for Improving Education in the Classroom*. Free Press.

Trentacosta, J. (1997) *Multicultural and gender equity in the mathematics classroom: The gift of diversity.1997 Yearbook*. Reston, VA: NCTM.

Webb, N.L. (1993) *Assessment in the Mathematics Classroom: 1993 Yearbook*. Reston, VA. NCTM.

Wilson, P. (1993) *Research ideas for the classroom: High School Mathematics*. Reston, VA: NCTM.

Web Sites

http://www.hubmub.com Mr. Straight's personal page, which will house some resources for this course throughout the semester.

http://www.nctm.org Home page for the National Council of Teachers of Mathematics.

http://illuminations.nctm.org/ NCTM Illuminations site – lesson plans, interactive investigations, resources.

http://www.nysed.gov Web site for the New York State Education Department.

http://www.regentsprep.org A valuable site for Math A and Math B Regents exam resources.

http://www.lessonplanspage.com One of many lesson plan sites.

http://curriculum.calstatela.edu/faculty/psparks/theorists/501const.htm Overview of constructivism.

http://www.mathforum.com An excellent data base site for mathematics education issues, research, lesson plans, and problem solving.

http://www-groups.dcs.st-and.ac.uk:80/~history/ This archive developed by St. Andrews University provides the biographies of over 1000 mathematicians.

http://www.c3.lanl.gov/mega-math/index.html This web site develops important mathematics ideas at a level school students and teachers can understand.

http://people.clarityconnect.com/webpages/terri/terri.html A math teacher's Web Site with links to great resources.

http://education.ti.com/ Texas Instruments Home Page – information and resources on calculators

http://keypress.com Key Curriculum Press Home Page – Geometer's Sketchpad

http://www2.edc.org/mathproblems/teacher/trHome.asp "Problems with a point" – teacher resources

http://www.mathematicallysane.com A web site that serves as a resource for mathematics reform efforts.

http://www.mathematicallycorrect.com A web site that expresses concerns about the mathematics reform movement.

http://www.jmap.org Another well-developed site with assistance for teaching Math A and Math B in NYS.