

**MATHEMATICS IN THE ELEMENTARY SCHOOL**  
**EDCI 364**  
**COURSE OUTLINE**  
**Spring 2009**

Course Instructor:  
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**What follows is the course syllabus for EDCI 364. It was developed by the course coordinator. This plan is to be taken as an outline that individual instructors may deviate from at their own discretion. If you have questions or concerns, please contact your course instructor.**

**Introduction**

EDCI 364 is a course about teaching mathematics in the elementary school. This is an exciting time in mathematics education because in the past, mathematics instruction has focused on students' learning of basic facts and skills. Today, the emphasis is quite different. Mathematics is taught for understanding, and children are involved in: 1) *problem solving*; 2) mathematical *reasoning*; 3) *communicating* about mathematics; 4) making *connections* among mathematical ideas and applying mathematics in contexts outside mathematics; 5) creating and using *representations* of mathematical concepts.

Therefore, rather than being a topic taught with an emphasis on rote memory, school mathematics is now viewed completely differently. Naturally, this means a completely different type of pedagogy for teachers. This is the focus of EDCI 364—the work of teaching mathematics.

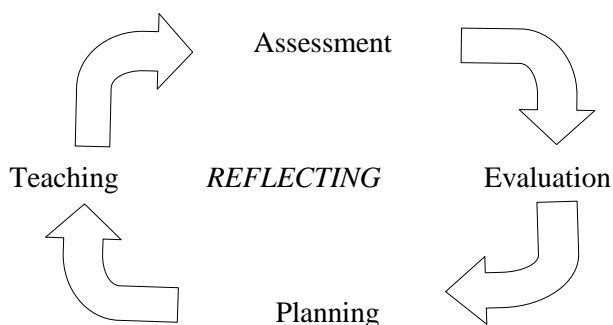
The National Council of Teachers of Mathematics (NCTM) has published a series of documents on: what mathematics should be taught; how mathematics should be taught, and how the learning and teaching of mathematics should be assessed. The most recent of these documents, *Principles and Standards for School Mathematics (PSSM)* <<http://www.nctm.org/>> was published in April, 2000. This document, which is an update and synthesis of previous publications, includes recommendations about: what mathematics should be taught; how it should be taught; and how the learning and teaching of mathematics should be assessed. Indiana has changed its licensure procedures so that beginning teachers are evaluated on whether their teaching incorporates the new recommendations.

As a student in this course, you will learn about teaching mathematics based on these new recommendations. To accomplish this, you will:

1. Explore and reflect on your own mathematical history and your beliefs about mathematics and about learning and teaching mathematics.
2. Investigate children's ways of thinking and reasoning about mathematics.
3. Examine what it means to teach mathematics when problem solving, reasoning, communication, connections and representations are the foci.

## **Block V Teaching and Learning Framework**

As one of three courses in Block V (including EDCI 365 and EDPS 430), EDCI 364 is designed to help you think about teaching and learning in the context of elementary school mathematics. A teaching and learning cycle framework (see figure, below) with components of *assessment*, *evaluation*, *planning*, and *teaching* is used across the courses in Block V to facilitate an understanding of the connectedness of teaching and ongoing assessment/evaluation across all content areas represented. The *assessment* component consists of data gathering through a variety of sources including, but not limited to, classroom observations, interviews, and children's oral and written products. The *evaluation* component is targeted toward interpreting these data--looking for patterns in children's behaviors and thinking related to mathematics. The *planning* component of the framework involves planning for instruction based on this evaluation. Planning will create opportunities to enhance, clarify, and build on children's current mathematical understanding. The final part of the framework, the *teaching* component, presents opportunities for the teacher to support children's movement towards more mature mathematical understanding. All four components are linked to an important feature of teachers' active learning, *reflecting*. Effective teachers are committed to professional growth through continuous reflection in and on their practice. Additionally, the four components are related to another important feature of teachers' active learning, *joint work*. Effective teachers are committed to professional growth through collaboration to improve their practice.



In Block V, the inquiry teaching model is used for all learners in Science and Mathematics.

### **Expected Outcomes**

EDCI 364 is designed to help you continue to develop the knowledge, dispositions, and performances that address the School of Education Guiding Principles in Practice: 1) Attention to Learners; 2) Understanding Curriculum in Context; and 3) Commitment to Professional Growth. In particular, by the end of EDCI 364, we expect that you will:

- Clarify and refine your beliefs about learning and teaching mathematics;
- Present and defend your beliefs about elementary mathematics teaching;
- Become more knowledgeable about how children think about mathematics;
- Use questioning to reveal students' mathematical thinking and understanding;
- Gain skill in assessing, evaluating, and responding to the needs of diverse learners in mathematics;
- Understand ways to assess students' mathematical understanding and learning;
- Learn, practice, and reflect on strategies of teaching mathematics and their relationships to your beliefs and knowledge about how children learn mathematics;
- Learn to participate in joint work to develop teaching and learning situations;
- Plan and carry out problem-solving mathematics instruction with a focus on students' conceptual and procedural understanding;
- Become aware of a variety of resources for teaching mathematics;

- Reflect on your teaching of mathematics.

### Course Format

EDCI 364 has both a campus-based and a field-based component. The campus-based component consists of 3 hours of lecture each week. In addition to the on-campus meetings of the course, students will be scheduled into a field placement for eight three-hour blocks during the semester. The Theory Into Practice (TIP) field component is shared with EDCI 365. Each cohort section of the block is partnered with its own local school. Each team of Purdue students will be matched with one classroom throughout the semester and will carry out mathematics and science activities in conjunction with the block courses. The three hours of TIP time includes: ½ hour of travel and up to 2 ½ hours teaching mathematics and science in the classroom.

### Course Readings

Text: Van de Walle, J. (2007). *Elementary and middle school mathematics: Teaching developmentally* (6<sup>th</sup> edition). Boston: Pearson Education.

Articles: Ball, D. L. (1992). Magical hopes: Manipulatives and the reform of mathematics education. *American Educator: The Professional Journal of the American Federation of Teachers*, 16(2), 14 - 18, 46 - 47.

Frank, M. (1989). Problem solving and mathematical beliefs. *Arithmetic Teacher*, 37, 32-34.

Paley, V. G. (1987). On listening to what the children say. In M. Okazawa-Rey, J. Anderson & R. Traver (Eds.), *Teachers, teaching, and teacher education* (pp. 77-86). Cambridge, MA: Harvard Education Review.

Russell, S. J. (1999). Mathematical reasoning in the elementary grades. In L. Stiff (Ed.), *Developing mathematical reasoning in grades K-12: 1999 NCTM Yearbook* (pp. 1-12). Reston, VA: National Council of Teachers of Mathematics.

Russell, S. J. (2000). Developing computational fluency with whole numbers. *Teaching Children Mathematics*, 6(10), 154-158.

You are expected to complete all assigned readings **before** we meet for classes. Although we will not manage to discuss everything that is in every reading during our meetings, it will be assumed that you've read the assignment. Please bring to class, for discussion with colleagues, all doubts, comments, and ideas that come up during your reading of the assigned texts.

### Course Assignments

The requirements for all major assignments are detailed below. You are expected to demonstrate correct use of the English language with regard to grammar, punctuation, and spelling (please follow APA 5<sup>th</sup> edition guidelines). I do grade on technical writing skills as well as content. Please proofread your work before turning it in to me. If you have weaknesses in the area of grammar, punctuation, or spelling, find someone who will proofread your work for you before you turn it in. It is expected that you will do your assignments on a word processor. Any exceptions must be cleared with the instructor in advance. Assignments that are not typed will be returned without a grade.

**I would prefer that you submit your assignments as an e-mail attachment. Label each assignment with your last name and the assignment. For example, if Nicolas Cage were to turn in the mathematics autobiography assignment, he would name the file "Cage\_autobiography."** Please remember to include the file extension (for example .doc for a word file). Assignments should be emailed to the instructor prior to class on the day they are due. Late assignments will be assessed a penalty of 10% of the grade for each day they are late.

I will try to make the purpose of each assignment clear. If you have questions about the purpose of the assignment or what is expected of you, please ask.

Course grades (Based on new Krannert School of Management policy of + / - grading): will be based on total points earned, and the following scale will be used to assign final grades.

A+	97 - 100.0%
A	92 - 96.9%
A-	90 - 91.9%
B+	87 - 89.9%
B	82 - 86.9%
B-	80 - 81.9%
C+	77 - 79.9%
C	72 - 76.9%
C-	70 - 71.9%
D+	67 - 69.9%
D	62 - 66.9%
D-	60 - 61.9%
F	< 60%

Grades will be based on the following:

Assignments (see following pages)	130 points
Written final exam	60 points
Participation & <u>Professionalism</u>	20 points
<b>TOTAL</b>	<b>210 points</b>

### **PARTICIPATION & PROFESSIONALISM (20 pts)**

An important aspect of learning to teach is, in part, a function of being a member of a community of learners that interacts to build knowledge about teaching and children’s learning. Another important aspect of learning to teach is engagement and *joint work*. Effective teachers are committed to professional growth through participation and collaboration to improve their practice. Thus, these points are for individual participation, joint work with your classmates during campus-based classes, TIP work, and engagement in the TIP classroom.

## **DESCRIPTION OF ASSIGNMENTS**

### **MATHEMATICS REFLECTION (10 pts.)**

Please provide me with a brief mathematics autobiography. The purpose of this assignment is two-fold: 1) to help me get to know you better and 2) to help you assess how you feel about mathematics, why you feel this way, and how these feelings might influence you as a mathematics teacher. Include (but do not limit yourself to) the answers to the following questions:

1. How do you define “mathematics”?
2. Describe yourself as a mathematics learner. Are you good at mathematics? How do you know?

3. What are the experiences you've had with mathematics that stand out most in your mind? Do you view them as positive or negative? How have they affected your teaching philosophy?
4. How do you think students best learn mathematics? What evidence do you have for thinking that way?
5. What mathematics do you think students need to learn in elementary school?
6. What are the qualities most likely to make a "good" mathematics teacher? Why do you feel that way?
  - a. Which of the qualities you mentioned do you feel you possess and how do you know?
  - b. Which of the qualities you mentioned do you feel that you lack right now and how do you know?
7. What are the qualities most likely to make a "bad" mathematics teacher? Why do you feel that way?
  - a. Which of the qualities you mentioned do you feel you possess and how do you know?
8. What do you think is the most difficult part of being a mathematics teacher and why?
9. What do you need to learn in order to become a better mathematics teacher?

### **VISIONS OF TEACHING (15 pts.)**

It is the first day of your first mathematics methods class of your elementary education program here at Purdue University. Project yourself forward in time until you find yourself working at your first full time teaching job. You are in your classroom at the end of the school day. It is sometime in the middle of the school year. You are teaching the grade level you've most wanted to teach, in a school that you are happy to be teaching in.

Part I: Write a narrative describing the school, your classroom, and the mathematics lesson you taught on that day. Please address the following topics, but also feel free to add other information as you see fit. Be as descriptive and detailed as you possibly can.

- *Describe the general school environment.* Where is it located? Is it a large or small school? Describe the children who attend this school? What do their parents do for a living?
- *Describe the physical environment of the classroom.* How is the furniture arranged? What is in your classroom that pertains to your mathematics teaching program? Please include a picture or diagram to help you describe your classroom to me.
- *Describe what happened during math class that day.* What was the topic? What was your goal for the day? How did your students interact with you during the mathematics lesson? How did they interact with other students? How did you feel about the lesson? Was it successful? How did you know?
- *Describe, in general terms, your plans for the next day of math class.* What topic will you cover next? How do you plan to teach that topic?
- *Describe, in general terms what you hope students learn from your mathematics class during the course of the year.* What are your big goals? How do your students view you as a mathematics teacher?

Part II: After completing your vision, reflect back on the process and think about where the different ideas you used came from. What experiences and/or memories did you use to help you answer the questions? Was there specific information that you drew upon to help you? Write a reflection summarizing the influences on your choices. Be as specific as you possibly can as to how you came to describe your future classroom.

### **READING SUMMARIES/QUIZZES (3 pts. each)**

After reading the assigned *article*, compose a list of the main issue(s) the author raises and relate the idea(s) to other readings or to personal or TIP experience. Bring a typed response to class on the date that the reading assignment is due. "Did you read it" quizzes on the Van de Walle textbook readings may also be given from time to time.

## THEORY INTO PRACTICE (TIP) ASSIGNMENTS

These assignments are connected to your TIP classroom experiences and consist of planning, teaching and assessing a series of problem solving and problem-centered lessons developed to promote student mathematical understanding. These assignments require you to take an *inquiry teaching* stance that is compatible with that advocated in the NCTM and INTASC standards.

- Please Note: Assignments conducted during TIP must be taught in the classroom. Any alterations must have Course Instructor and Cooperating Classroom teacher approval.
- Exploring Student Thinking – In the first couple days of the TIP experience you will be working one on one with a student posing problems for the child to solve. You and your partner will work together to prepare the tasks you will use and complete a Task Preparation Report for each day of problem posing. After **the second day** of the problem posing experience, you will **each write** a paper (roughly 1250 words) describing two or three of the mathematical problems you posed and give a summary of the child's solution process. Explain in detail how the child solved the problem. Make sure you are relaying the **student's** thoughts and reasoning. Do not simply observe and make assumptions about what you think they are doing; use questioning techniques to elicit student thoughts and ideas. **Next**, describe what you did during each task. What questions did you ask? What would you do differently if you were using the same tasks again with similar students? **Finally**, describe what you learned from this experience? Did anything surprise you? How will your experiences influence your approach the next time you work with students? What did you learn from the first day of problem posing that you used on the second day? You should also include the name, age, and grade of the student you interviewed; the teacher's name; as well as any other pertinent information about the child you would like to mention. Please feel free to audio record your sessions if you feel it will help you. **(20 points)**
- Materials Inventory - An inventory of all mathematics related teaching resources and manipulatives that are available. Indicate whether the resources are available in the teacher's room, in the media center, or some other place at the school. This list should also include the textbook materials being used within the classroom. **(5 points)**

### Lesson Planning/Teaching

Due to the limited number of placements we have available to us in the Block V schools, you will be paired with another student in your TIP classroom. However, I feel it is important for you to have an opportunity to teach lessons on your own. As such you and your partner will be responsible to teach four lessons total during the TIP experience. Each of you will teach two lessons. While your partner is teaching, you will be in the role of observer. Details on the teaching assignments are described below.

You will have two opportunities to teach mathematics lessons in your classroom. For each lesson you will submit the following items:

1. Task Preparation Report
  2. Lesson Plan
  3. Reflection
- Implement a mathematics lesson from a **reform based curriculum**. Using a mathematical topic chosen by your cooperating teacher, you and your partner will prepare 2 lessons from a reform based curriculum (Everyday Math or Investigations in Number, Data, and Space). Each of you will be responsible for teaching one of the lessons. You will complete a Task Preparation Report as part of each lesson's preparation. After teaching the lesson you will write a personal reflection (approximately 750

words). In your reflection include an analysis of whether or not the children learned what you intended to teach (and what specific evidence you have of this) and what you would do differently if you were to teach this lesson again. In writing this, please refer to the questions posed on the Lesson Reflection Handout. **(20 points)**

- Plan and teach a **problem based – student centered** mathematics lesson. As a team, you and your partner will plan 2 problem based – student centered lessons. Each one of you will be responsible for teaching one of the lessons. The topics for these lessons will be negotiated with your classroom teacher. You will complete a Task Preparation Report as part of each lesson's preparation. After teaching the lesson you will each write a personal reflection (approximately 750 words). In your reflection include an analysis of whether or not the children learned what you intended to teach (and what specific evidence you have of this) and what you would do differently if you were to teach this lesson again. In writing the reflection, please refer to the questions posed on the Lesson Reflection Handout. **(25 points)**

### **FINAL REFLECTION PAPER (20 pts)**

Your final assignment for the semester asks you to revisit your experiences from the semester and synthesize them into a final paper. As you reflect on the readings as well as your experiences within the course, you should also examine the ideas you presented within your original mathematics reflection paper as well as your visions of teaching assignment. Use these documents, along with your experiences within the TIP classroom to write about your current vision for teaching mathematics within the elementary school. You should also comment on how your vision may have changed as a result of the work we did this semester, what specific experiences helped you to define your vision, and what you believe you will need to do in order to make your vision a reality within your own mathematics classroom. The paper should be ~5 pages long.

### **TASKSTREAM PORTFOLIO AND ARTIFACT (Pass/Fail)**

You will be required to submit four pieces of work as the artifact for your Taskstream Portfolio. These will demonstrate your ability to use student mathematical thinking and standards-based documents to design and teach lessons for student learning with understanding. These pieces are:

- (1) Final Reflection paper
- (2) Task Preparation Report from a lesson you taught
- (3) Lesson Plan from a lesson you taught
- (4) Personal Reflection from a lesson you taught

### **You must pass the Gate C Taskstream Portfolio assignment in order to pass EDCI 364.**

Failure to pass the Gate C Taskstream Portfolio assignment for EDCI 364 will result in receiving a grade of 'F' for the course. A description of the artifact and assessment matrix will be distributed.

#### **➤ Please Note:**

#### **Attendance:**

#### **CLASS ATTENDANCE STATEMENT**

Purdue University policy states that all students are expected to be present for every meeting of classes in which they are enrolled. All matters relative to attendance, including the make-up of missed work, are to be arranged between you and the instructor. Only the instructor can excuse you from classes or course responsibilities. In the case of an illness, accident, or an emergency, you should make direct contact with your instructor as soon as possible, preferably before the class. If the instructor cannot be reached directly a message should be left in the instructor's department mailbox or with the instructor's secretary. If you will

be absent for more than five days, have not been able to reach the instructor in person or by telephone or through leaving notification of your circumstances with the instructor's secretary, you or your representative should notify the Office of the Dean of Students (765-494-1254) as soon as possible after becoming aware that the absence is necessary. Be advised, you may be asked to provide documentation from an authorized professional or agency which supports an explanation for your absence.

#### *Campus-based class meetings*

Because of the interactive and field-based nature of this course, regular attendance is required. **Each unexcused absence from the campus-based class meetings will result in your final grade being lowered by 2 percentage points.**

#### *TIP*

No **unapproved** absences will be accepted during the mathematics teaching portion of your TIP experience. **Each unapproved TIP absence during the mathematics teaching portion will automatically result in a 5 percentage point reduction of your final grade. You must contact your course Instructor if you are absent.**

#### EMERGENCY STATEMENT

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in *this* course. My email address: atyminsk@purdue.edu, and my office phone: 494-3254.

#### BEERING HALL EMERGENCY STATEMENT

Students are required to visit <http://www.education.purdue.edu/ODFD/resources.html> to review the response procedures for emergencies in Beering Hall. It is necessary that you review these directions within the first week of your Beering classes. If you have any questions see your instructor.

#### ADAPTIVE PROGRAMS STATEMENT

Students with disabilities must be registered with Adaptive Programs in the Office of the Dean of Students before classroom accommodations can be provided. If you are eligible for academic accommodations because you have a documented disability that will impact your work in this class, please schedule an appointment with me as soon as possible to discuss your needs.

#### ACADEMIC DISHONESTY STATEMENT

Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, [University Regulations](#)] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]

#### ELEMENTARY EDUCATION COURSE COMPLETION POLICY STATEMENT †

Elementary Education majors have two opportunities to enroll in and pass required EDCI, EDPS, and EDST courses with a minimum grade of C. Withdrawal from a course (W or WF) constitutes one of the two opportunities. Failure to successfully meet these requirements will result in dismissal from the Elementary Education Program. Courses repeated to improve a grade must be taken at the West Lafayette campus. [Approved by the Elementary Teacher Education Committee, April 20, 2007.]



EDCI 364 TEACHING MATHEMATICS IN THE ELEMENTARY SCHOOL  
(Tentative Schedule)  
**Spring 2009**

<b>Topics</b>	<b>Monday/Tuesday</b>	<b>Wednesday/Thursday</b>	<b>Assignments Due</b>
<b>Week 1</b> (1/12 – 1/16)	<u>Problem solving and Math Reform</u>  Read: Ch. 1 & Ch. 4 VdW Do: Mathematics Reflection	<u>Problem solving and Math Reform</u>  Read: Frank article Do: Visions of Teaching; Frank Summary	Mathematics Reflection (W/Th)
<b>Week 2</b> (1/19 – 1/23)	<i>No Class</i>  <i>MLK Day</i>	<u>Constructivism; Understanding; Mathematical Power</u>  Read: Ch. 3 VdW	Visions of Teaching (W/Th) Frank Summary (W/Th)
<b>Week 3</b> (1/26 – 1/30)	<u>Counting and Counting on</u>  Read: Paley article Do: Paley Summary	<b>Prepare for TIP</b>	Paley Summary (W/Th)
<b>Week 4</b> (2/2 – 2/6)	<b>TIP Experience</b>  <b>Observation, Exploration, Acclimation</b>	<b>TIP Experience</b>  <b>Exploring Student Thinking I</b>	
<b>Week 5</b> (2/9 – 2/13)	<b>TIP Experience</b>  <b>Exploring Student Thinking II</b>	<u>Addition and Subtraction I</u>  Read: pp. 143-151; 216 - 222 VdW	
<b>Week 6</b> (2/16 – 2/20)	<u>Addition and Subtraction II; Concept of 10 &amp; Place Value</u>  Read: pp. 152-164 VdW	<u>Multiplication</u>  Read: pp. 228-244 VdW	Exploring Student Thinking Paper (M/T)  Materials Inventory (W/Th)
<b>Week 7</b> (2/23 – 2/27)	<u>Multiplication and Division</u>  Read: Russell [Fluency] Do: Russell [Fluency] Summary	<u>Division</u>  Read: Russell [Reasoning] Do: Russell [Reasoning] Summary	Russell [Fluency] Summary (W/Th)

<b>Week 8</b> (3/2 – 3/6)	<u>Fractions I</u> Read: Ch. 16 VdW	<u>Fractions II</u> Read: Ch. 17 VdW	Russell [Reasoning] summary (M/T)
<b>Week 9</b> (3/9 – 3/13)	<u>Fractions III</u> Read: Ball article Do: Ball Summary	<u>Fractions IV</u>	Ball Summary (W/Th)
<b>Week 10</b> (3/16 – 3/20)	<b>No Class</b> <b>SPRING BREAK</b>	<b>No Class</b> <b>SPRING BREAK</b>	
<b>Week 11</b> (3/23 – 3/27)	<b>Planning for TIP</b> <b>Exam Review</b>	<b>Planning for TIP</b>	1 <sup>st</sup> two lesson topics for TIP due (M/T) <b>EXAM Th Night 3/26</b> <b>(time and place TBA)</b>
<b>Week 12</b> (3/30 – 4/3)	<b>TIP Experience</b> <b>Teaching Day</b>	<b>TIP Experience</b> <b>Teaching Day</b>	
<b>Week 13</b> (4/6 – 4/10)	<b>TIP Experience</b> <b>Teaching Day</b>	<b>TIP Experience</b> <b>Teaching Day</b>	Draft of Written Lesson Plans (F)
<b>Week 14</b> (4/13 – 4/17)	<b>TIP Experience</b> <b>Teaching Day</b>	<b>TIP Experience</b> <b>Teaching Day</b>	Curriculum Lesson Materials (W/Th);
<b>Week 15</b> (4/20 – 4/24)	<b>TIP Experience</b> <b>Possible Make up</b> <b>Teaching Day</b> <b>(If necessary)</b>	<b>TBA</b>	Written Lesson Materials (M/T)
<b>Week 16</b> (4/27 – 5/1)	<b>TBA</b>	<b>TBA</b>	Final Reflection Paper (F)
<b>Week 17</b> (5/4 – 5/8)	<b>EXAM WEEK</b>	<b>EXAM WEEK</b>	Task Stream Materials Posted by 5pm on Monday