



## **COURSE SYLLABUS**

### **EDU 920: Using Literature to Teach Mathematics**

**Instructors: Wil and Luetta Reimer**

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Number of Units: 3 Semester Units

Grade Level: K - 6

### **Course Description**

This course has been designed to help K-6 teachers recognize the potential of using children's literature to teach mathematics and to learn effective ways of unleashing that potential in the classroom. Whether teachers are introducing a mathematical concept or facilitating an extended investigation, children's literature offers them an engaging link between mathematics and the world of children.

Teachers will learn how to select outstanding children's literature to use in mathematics teaching, how to model problem posing and problem solving using literature, and how to design and develop a variety of mathematical activities inspired by children's books.

This course is designed to meet the objectives identified in the Common Core State Standards in Language Arts and Mathematics, as well as the five core propositions of the National Board for Professional Teaching Standards. Students will be asked to make connections between their work and these standards or the standards of their own states.

### **Course Dates:**

This course is self-paced; students may enroll at any time and take up to a year to complete assignments. No course should be completed in less than three weeks (one week per credit).

## **Course Materials**

Text (Included):

Whitin, David and Phyllis Whitin. *New Visions For Linking Literature and Mathematics*. NCTE, Urbana, IL, 2004.

## **Course Requirements**

To complete this course satisfactorily, participants must submit

1. Assessment of a children's literature text, using the criteria in Chapter 1 (approximately one page).
2. List of ideas for classroom integration (approximately one page total).
3. Collection of mathematical activities based on two children's literature texts.
4. Lesson for posing mathematical problems.
5. Lesson utilizing a book pair.
6. List of readings and evaluation of the teaching of two lessons.
7. List of three recommended Internet sources.

See the "Schedule of Topics and Assignments" for more details on these assignments.

All work should be typed and sent to the instructor at one time when the course is completed. Please make a copy; work will not be returned. Students have one full year to finish the course but should not finish in less than three weeks from the date of registration.

**Send completed work by email attachments to: [wreimer@fresno.edu](mailto:wreimer@fresno.edu)**

**OR**

**Mail all the above items to:**

Wil or Luetta Reimer  
1549 S. Lind Avenue  
Fresno, California 93727

**IN EITHER CASE, request online grading: <http://ce.fresno.edu/cpd>**

# **National Standards:**

## Common Core Standards for Mathematics

### **a. Problem Solving**

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals.

### **b. Reasoning**

Mathematically proficient students make sense of quantities and their relationships in problem situations.

### **c. Constructing Arguments**

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments.

### **d. Modeling**

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace.

### **e. Using Strategic Tools**

Mathematically proficient students consider the available tools when solving a mathematical problem.

### **f. Attending to Precision**

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning.

### **g. Using Structure**

Mathematically proficient students look closely to discern a pattern or structure.

### **h. Expressing Repeated Reasoning**

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts.

## **National Standards:**

The Common Core State Standards Initiative (CCSS) Anchor Standards for Reading (Grades K-6) are listed here:

### **Key Ideas and Details**

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

### **Craft and Structure**

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

### **Integration of Knowledge and Ideas**

7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

### **Range of Reading and Level of Text Complexity**

10. Read and comprehend complex literary and informational texts independently and proficiently.

# **National Board for Professional Teaching Standards: Five Core Propositions**

In addition to the content standards referenced above, this course supports the following core propositions that characterize National Board Certified Teachers (NBCTs).

## **Proposition 1: Teachers are Committed to Students and Their Learning**

- NBCTs are dedicated to making knowledge accessible to all students. They believe all students can learn.
- They treat students equitably. They recognize the individual differences that distinguish their students from one another and they take account for these differences in their practice.
- NBCTs understand how students develop and learn.
- They respect the cultural and family differences students bring to their classroom.
- They are concerned with their students' self-concept, their motivation and the effects of learning on peer relationships.

## **Proposition 2: Teachers Know the Subjects They Teach and How to Teach Those Subjects to Students.**

- NBCTs have mastery over the subject(s) they teach. They have a deep understanding of the history structure and real-world applications of the subject.
- They have skill and experience in teaching it, and they are very familiar with the skills gaps and preconceptions students may bring to the subject.
- They are able to use diverse instructional strategies to teach for understanding.

## **Proposition 3: Teachers are Responsible for Managing and Monitoring Student Learning.**

- NBCTs deliver effective instruction. They move fluently through a range of instructional techniques, keeping students motivated, engaged and focused.
- They know how to engage students to ensure a disciplined learning environment, and how to organize instruction to meet instructional goals.
- NBCTs know how to assess the progress of individual students as well as the class as a whole.
- They use multiple methods for measuring student growth and understanding, and they can clearly explain student performance to parents.

**Proposition 4: Teachers Think Systematically about Their Practice and Learn from Experience.**

- NBCTs model what it means to be an educated person—they read, they question, they create and they are willing to try new things.
- They are familiar with learning theories and instructional strategies and stay abreast of current issues in American education.
- They critically examine their practice on a regular basis to deepen knowledge, expand their repertoire of skills, and incorporate new findings into their practice.

**Proposition 5: Teachers are Members of Learning Communities.**

- NBCTs collaborate with others to improve student learning.
- They are leaders and actively know how to seek and build partnerships with community groups and businesses.
- They work with other professionals on instructional policy, curriculum development and staff development.
- They can evaluate school progress and the allocation of resources in order to meet state and local education objectives.

**Learning Outcomes:**

**Participants in this course will be able to**

- 1) identify the value of teaching mathematics through literature. (NBPTS Props. 2, 4, & 5)
- 2) explore sources of appropriate children's literature. (CCSS 1, 3, 4, 7, 8, & 9; NBPTS Props. 1-5)
- 3) select and use effective texts and activities. (CCSS a-h; 1, 3, 4, 7, 8, & 9; NBPTS Props. 1-5)
- 4) design and teach lessons that achieve meaningful integration. (CCSS a-h; 1, 3, 4, 7, 8, & 9; NBPTS Props. 2, 3, & 4)
- 5) demonstrate how activities are connected to a standards based curriculum. (NBPTS Prop. 5)

# Schedule Of Topics And Assignments

## A. Reading:

Read the entire text, *New Visions for Linking Literature and Mathematics*.

## B. Assignments:

1. Chapter 1 of *New Visions* offers an overview of the standards in both language arts and mathematics, but its major purpose is to describe four criteria for selecting outstanding children's literature to use in mathematics teaching.

Using the four criteria identified on pages 2 and 4, evaluate a book appropriate for your grade level. Follow the example on pages 8-10 in the text. The book may be selected from your own collection, from a library, from the course text, or from titles referenced in Chapter 5.

2. Chapter 2 of *New Visions*, entitled "Books for a Wide Range of Ages," illustrates how three teachers have used children's literature for mathematical exploration.

Drawing from these examples or other material in the chapter, describe three new ideas you think you could try in your classroom.

3. Select two children's literature texts not fully explored in the course text and identify at least four mathematics activities for each. State the title and author of the book. Write a very brief summary of the story and describe your proposed activities.
4. In Chapter 3, on "Problem Posing with Children's Literature," the authors explain the strategy of describing, extending, and modifying the attributes of a problem or story situation.

Select a literature text and develop a lesson using the strategies for posing mathematical problems or for allowing students to do the same. It is not necessary to teach this lesson at this time.

5. Chapter 4 of *New Visions* explains the value of using book pairs. Select a pair of texts from pages 116-121 or from another source.

Design a lesson that will guide a class or student investigation of a book pair. It is not necessary to teach this lesson at this time.

6. Using a library, a bookstore, or an internet site, select and read at least ten books for your grade level that are new to you, looking for specific ways they could be used to reinforce or teach a mathematical concept. List ten books, identifying them by title and author.

Select two of the books you find most engaging. Design and teach two lessons that each use at least one book. Consider utilizing the strategies demonstrated in *New Visions*. Briefly evaluate each lesson, including these elements:

- a. Children's literature text selected
- b. Exploratory mathematical activities used
- b. Lesson objectives
- c. Common Core standard(s) addressed
- d. How fully were your objectives met?
- e. How might you adjust the lesson or reinforce the concepts taught?

### **C. Internet Resources:**

Preview some of the many online resources about using children's literature to teach mathematics. Some of these include sample lessons, while others offer a broader explanation of the value of this approach. These sites may be easily accessed by typing "using literature to teach mathematics" into a search engine.

Identify and briefly describe three web sources you would recommend to your colleagues.

**\*Note: If you are not currently teaching or are unable to use these strategies in the classroom, collect a few children from your family or neighborhood and try the activities with them, reporting their responses for Assignment #6.**

### **Evidence of Learning:**

- Instructor observed evidence of understanding of course objectives as demonstrated through student's reflective writing assignments. (Outcome 1; Assignments 1, 2 & 6)
- Instructor observed evidence of understanding mathematical terminology as demonstrated through student's reflective writing assignments. (Outcomes 1, 2 & 6; Assignments 1-6)
- Student demonstrated openness towards and creative use of a variety of learning methodologies and strategies. (Outcomes 1, 2, 3 & 4; Assignments 1-6)
- Student demonstrated his/her understanding of effective design of lesson plans. (Outcomes 3 & 4; Assignments 3-6)
- Student reflected the use of critical thinking skills (Outcomes 1 & 4)
- Student made connections to state content and/or professional teaching standards. (Outcome 5; Assignments 3, 4, & 5)

## **Grading Policies and Rubric:**

Grades will be determined using the following percentages:

1. Assessment of children's literature text: 15%
2. List of ideas for classroom integration: 5%
3. Collection of mathematical activities based on two texts: 10%
4. Lesson for posing mathematical problems: 10%
5. Lesson utilizing a book pair: 10%
6. List of readings and evaluation of the teaching of two lessons: 40%
7. List of three recommended Internet sources: 10%

Responses and lessons will be evaluated to determine thoughtful, engaged reflection, incorporation of course concepts, and effective, creative classroom procedures. Coursework is to be typed. Instructions regarding reading and writing assignments should be followed carefully.

Total scores determine the final grade:

90 - 100% = A

80 - 89% = B

79% or below = no credit

All coursework must reflect a minimum "B" quality to receive credit. The discernment between an A and a B is at the discretion of the instructor, based on the quality of work submitted (see assignment rubric). Participants may request either a letter grade (A or B) or credit (CR). Coursework falling short of a "B" or CR grade will be returned with further instructions. Every person with a score of 80% or above will receive three semester units of credit.

## Scoring Rubric

Type of Assignment	90 – 100 points Exceptional	80 – 89 points Adequate	70 – 79 points Not Acceptable
Written responses	Student's written responses show an exceptional investment of time, energy and thoughtful reflection. The work submitted by the student is original and thorough. The student effectively organizes key insights and demonstrates evidence of interaction with the texts and exercises.	Student's written responses show an adequate investment of time, energy and thoughtful reflection. The work submitted by the student is complete, but lacks thoroughness and originality. The student sufficiently organizes insights and demonstrates evidence of interaction with the course activities.	Student's written responses show little investment of time, energy and thoughtful reflection. The work submitted by the student does not show adequate thought or effort.
Lesson Design	Lesson plans show an exceptional investment of time, energy and thoughtful reflection. Student consistently makes connections to local instructional goals/standards and implements research-based strategies and approaches.	Lesson plans show an adequate investment of time, energy and thoughtful reflection. Student makes some connections to local instructional goals/standards and research-based strategies and approaches.	Lesson plans submitted by the student do not show adequate thought or effort, and may not address specific goals.
Lesson evaluations	Student includes the use of critical thinking and reflection in the evaluation of lessons implemented.	Student includes the use of reflection in the evaluation of lessons implemented, but may lack sufficient detailed analysis.	Student does not demonstrate critical thinking or reflection in the evaluation of lessons implemented.
Presentation	Student effectively organizes key insights into a thoughtful and well-structured presentation.	Student includes several key insights in a presentation.	Student presentation lacks key insights.
Research	Research accesses multiple sources available via the internet. Web descriptions demonstrate thorough engagement with site information.	Research accesses sources available via the internet. Web descriptions demonstrate adequate engagement with site information.	Research fails to access sources available via the internet. Web descriptions demonstrate little engagement with site.

## **Instructor/Student Contact**

Students are warmly invited to contact the instructor at any time with concerns, questions, or comments related to course work. They are specifically asked to do so after finishing the Reading component (Part A). At the completion of the course, the instructor will comment on the student's work and make suggestions, if needed.

## **Policy on Plagiarism**

All people participating in the educational process at Fresno Pacific University are expected to pursue honesty and integrity in all aspects of their academic work. Academic dishonesty, including plagiarism, will be handled according to the procedures set forth in the Fresno Pacific University Catalog.

## **University Information**

Graduate level course work reflects Fresno Pacific University's Desired Student Learning Outcomes as it applies to professional development to demonstrate the following:

- Oral and written communication in individual and group settings
- Content knowledge, and application of such knowledge in the student's area of interest to affect change
- Reflection for personal and professional growth
- Critical thinking
- Computational/methodological skills to understand and expand disciplines, including an understanding of technological systems