

**Course Title: Linear Function: *Looking at Lines*, Grades 5-9**  
**Instructor's Name: Richard Thiessen, AIMS Education Foundation**  
**Course Number: MAT 942**  
**Number of Credit Units: 3 semester units**

**Course Content/Description:**

This course seeks to build a foundation for teaching and understanding Linear Function Concepts. It is supported by classroom lessons written and compiled within the *AIMS* publication *Looking at Lines* which forms the nucleus of the course. Alignment of State and National Standards to the Learning Goals is also an integral part of this course.

The uniqueness of the AIMS approach lies in the extensive use made of real-world situations, which serve as the principle context for building understanding. Drawn from science, business, geometry, and other real world phenomena, the activities in *Looking at Lines* allow students to experience important linear function concepts in their natural settings where rich contexts for the integration of mathematics and science abound. Hands-on involvement heightens student interest and deepens understanding.

The AIMS approach makes it possible to introduce linear function concepts as early as the fifth grade and deepen understanding throughout middle school and early high school.

The activities build the necessary foundation for developing understandings and skills such as:

1. Identifying cause and effect in real world situations
2. Assigning input/output values to cause and effect
3. Abstracting sufficient input/output data for patterns to be discernable
4. Picturing input/output pairs on the coordinate plane
5. Formulating rules to generalize patterns in sets of input/output pairs
6. Distinguishing between proportional and non-proportional relationships
7. Understanding the meaning of positive and negative slopes
8. Interrelating equivalent elements in the real world, data table, graph, and rule
9. Interpreting the meaning of the rule as it applies to the original context

**Primary Learning Outcomes**

**Students will:**

1. Participate in opportunities for implementation and sustained use of hands-on experiences in mathematics in a classroom setting
2. Engage in reflective practice through the use of instructional planning, focused questions, and reflective responses
3. Make connections for conceptual understanding by showing alignment of instructional experiences with national reform documents and state content standards for mathematics
4. Develop positive attitudes and confidence in teaching and learning
5. Expand their knowledge base of mathematics education
6. Will make connections to professional literature regarding content, theory and practice

7. Will identify State or National Standards that apply to the selected AIMS activities by aligning learning goals with State or National Content Standards

## **Course Materials**

*AIMS Book – Looking at Lines*

**Manipulatives** for one class to be used with lessons from text

- 1 Reflect /View
- 15 Mirrors (3 in. x 5in.)

**An Overview of AIMS** (online- PDFs;

<http://www.aimsedu.org/downloads/pdf/download.php?file=sps.pdf>)

with required reading and application of ideas from the following:

*A Model of Learning*

*The Skills for Thinking*

(If Internet is not available to download the pdfs, AIMS can mail copies of these pages. Please email [spscourses@AIMSedu.org](mailto:spscourses@AIMSedu.org) or call 1-888-733-2467 ext 120 to request copies.)

Focus questions and guidelines for responses based on understanding and application of materials and ideas.

Overall plan for Implementation

Summary of Alignment with State Content Standards

Application of the Model of Mathematics

Application of Thinking Skills and Alignment with Standards and Learning Goals

Reflective Response and Focus Questions

Integrated Curriculum Form

Professional Growth and Reflection: A Response to Articles and Experience

## **Course Requirements/Schedule of Topics and Assignments**

1. Students will read completely the related *AIMS* publication, *Looking at Lines*.
2. Students will read the selected articles in **An Overview of AIMS** (online- PDFs; <http://www.aimsedu.org/downloads/pdf/download.php?file=sps.pdf>) with required reading and application of ideas from the following:  
*A Model of Learning*  
*The Skills for Thinking*  
(If Internet is not available to download the pdfs, AIMS can mail copies of these pages. Please email [spscourses@AIMSedu.org](mailto:spscourses@AIMSedu.org) or call 1-888-733-2467 ext 120 to request copies.)
3. Read the following articles in *Looking for Lines* prior to using any of the activities in the classroom:  
*Looking at Lines, Interesting Objects and Linear Functions*, pages V-VII  
*Looking Back*, pages VIII-IX  
*Algebraic Thinking in the Context of Linear Functions*, pages 1-2  
*Helping Students Gain Understanding through Investigations*, pages 3-9

4. Students will design a plan for implementation of ten (10) experiences from *Looking at Lines* including a summary of and rationale for the selection of *AIMS* lessons.
5. Students will choose one lesson from *Looking at Lines* and describe how it addresses the four learning environments of the **Model of Mathematics/Learning** and the **Model of Functions**, see pg V in *Looking at Lines*.
6. Students will implement ten (10) lessons in the classroom with students over a three to four week period.
7. Prior to teaching each lesson, students will apply the *Skills for Thinking* to the design of tasks and discussion questions reflecting important concepts, skills and processes integral to each lesson. Students will record these on pages labeled **Applying Thinking Skills**. Students will also record the Learning Goal and appropriate State Standards on pages labeled Applying Thinking Skills.
8. After each lesson, students will reflect upon their teaching by responding to the Reflective Response focus questions.
9. Show summary of alignment of learning goals with **State Content Standards**. Content Standards for each state may be found at this Web-site address:  
US Department of Education has links to the state department of education for each state.  
[http://wdcrobcolp01.ed.gov/Programs/EROD/org\\_list.cfm?category\\_ID=SEA](http://wdcrobcolp01.ed.gov/Programs/EROD/org_list.cfm?category_ID=SEA)
10. Complete a **Professional Growth and Reflection** form describing how the selected articles (see number 2 above) and the teaching experience impacted you and your teaching.

#### **Method of Assessment:**

Provide evidence of the design, implementation, evaluation and reflection of the collective experiences by returning the completed assignments.

Unless otherwise indicated, students successfully completing this course will earn a Credit/No credit grade or where a letter grade is requested in writing, a letter grade of B will be issued. In order to earn a letter grade of A, additional work beyond what is described will be required. (See Requirements for an A.)

The discernment between an A or a B is at the discretion of the instructor of record based on the quality of the evidence submitted.

#### **Additional requirement for an earned letter grade of A**

Prepare a scoring rubric for assessing student work. Submit five examples of scored student work together with a written analysis of their work for each of two activities: Stacking Cups (p. 156) and a second activity of your choice.

#### **University 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 on page 8 of the Fresno Pacific University Catalogue.