

Fresno Pacific University
Center for Professional Development

Course Syllabus

INT 918 Women in Mathematics and Science

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Course Description

In recent years, many individuals and organizations in the United States have worked hard to ensure that women have the same opportunities for education, for professional careers, and for advancement in their careers as men. Two of the fields in which women have been little represented in this country, or in any country, are mathematics and science.

In fact, it is possible to read the histories of mathematics and science and find little mention of women, although many have made important contributions. Who were those few who did succeed? Why were there so few? What were the barriers they faced, barriers which men of far less ability did not have to face?

This course, designed for teachers of grades 3 through 12, offers an exciting study of the contributions of women to mathematics and science. Too often we assume these areas are solely the domain of men, but women have made significant marks in these fields as well. Participants in this course will be inspired by what women have achieved and by the way they often overcame obstacles and prejudice in the pursuit of excellence.

Participants will select, read, and summarize the stories of ten women from the text, *Celebrating Women in Mathematics and Science*. They will also be asked to design six lessons to communicate in their classrooms the important role of women.

Course assignments ask participants to identify specific state or national standards addressed through the lessons presented. The primary resource used for standards in the development of this course is the NCTM (National Council of Teachers of Mathematics) Math Standards. This course is designed to assist teachers of students in grades 3 through 12.

Primary Learning Outcomes

Participants in this course will

- become familiar with some of the great woman mathematicians and scientists and learn about their contributions.
- gain confidence with a variety of approaches for implementing history into the classroom and be better prepared to design activities for classroom use.
- recognize the importance of teaching mathematics and science from a historical perspective.
- discover how the activities are connected to a standards based curriculum.

Specific Standards Addressed by this Course

The following standards identified by the National Council of Teachers of Mathematics* may be addressed throughout this course, depending on which activities teachers select to design and/or utilize.

Number and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Understand meanings of operations and how they relate to one another
- Compute fluently and make reasonable estimates

Algebra

- Understand patterns, relations, and functions
- Represent and analyze mathematical situations and structures using algebraic symbols
- Use mathematical models to represent and understand quantitative relationships
- Analyze change in various contexts

Geometry

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
- Specify locations and describe spatial relationships using coordinate geometry and other representational systems
- Apply transformations and use symmetry to analyze mathematical situations
- Use visualization, spatial reasoning, and geometric modeling to solve problems

Measurement

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Apply appropriate techniques, tools, and formulas to determine measurements

Data Analysis and Probability

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
- Select and use appropriate statistical methods to analyze data
- Develop and evaluate inferences and predictions that are based on data
- Understand and apply basic concepts of probability

Problem Solving

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving

Reasoning and Proof

- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof

Communication

- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and other

- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely

Connections

- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics

Representation

- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

*Principles And Standards For School Mathematics, National Council of Teachers of Mathematics, 2000.

Note: For this course, it may be appropriate to consult standards in science in addition to those in mathematics. State standards may be accessed through Didax Educational Standards <<http://www.didaxinc.com/standards.html>> or through your local educational offices.

Course Materials

The text for this course is

Celebrating Women in Mathematics and Science, by Miriam Cooney.

Included in the course binder is an appendix of supplementary materials and resources. Information about Fresno Pacific University, the School of Professional Studies, and the instructor, plus details on course policies and procedures is also included.

Course Requirements

A. Assignments:

To complete this course satisfactorily, participants must submit

1. ten (10) fact sheets generated after the readings.
2. lesson plans for the six activities designed to share information about women mathematicians and scientists.

Detailed explanations and suggestions are provided in "Schedule of Topics and Assignments."

B. Assessment:

Grades will be determined using the following percentages:

Ten fact sheets: 50%

Classroom lesson plans for six activities: 50%

Coursework is to be typed. Follow course instructions carefully.

Total scores determine the final grade:

90 - 100% = A

75 - 89% = B

74% or below = no credit

All coursework must reflect a minimum "B" quality to receive credit.

Participants may request either a letter grade (A or B) or credit (Cr) on the grade form to be returned with completed materials. Every person with a score of 75% or above will receive three semester units of credit.

C. Returning Completed Work:

Teachers should return completed work within one year of the date of registration, but not less than three weeks after registering.

It is not necessary to place work in binders or portfolios. Materials may be secured with a paper clip and mailed in a simple manila envelope. Regular U.S. postage is recommended. Certified, registered or express mail which requires a signature upon receipt is often delayed.

Keep a copy of all coursework in the unlikely event of mail loss. Work will not be returned.

Please return

1. Ten fact sheets.
2. Lesson plans for six activities.
3. Grade form.
4. Evaluation of the course (optional).

Mail all the above items to:

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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.

Schedule Of Topics And Assignments

A. Reading Component:

1. Choose 10 women from the text and read the chapters about them.
2. Complete a "fact sheet" about each woman you study. You may design your own form, recording information on standard paper, or on 5" x 7" cards, using any format you please.

Each "fact sheet" should include (but is not limited to) the following information:

- a. Name
- b. Date of birth
- c. Date of death
- d. Nationality
- e. Family background and childhood
- f. Education
- g. Obstacles: What do you think was the biggest problem she had to overcome? How did she face this challenge?
- h. Contributions to mathematics and/or science
- i. What did you like best about her story?
- j. What values or beliefs did this woman demonstrate that you admire or find interesting?
- k. What anecdote(s) might your students enjoy hearing?

Feel free to collect additional information from sources other than the text. Utilize books, periodicals, and the internet to learn more about the contributions of these important women.

B. Activity Component:

Design at least six creative ways to incorporate information about women mathematicians and scientists in your

classroom setting. You may use activities from a convenient resource or create your own. See the list of “Suggested Connecting Activities” in the appendix. Be imaginative as you design a learning experience likely to engage your students.

You may follow the accepted lesson plan format for your district or a plan which is functional for your teaching situation. While it should be specific and detailed, it need not be more than one or two pages. Each plan should include (but is not limited to) the following elements:

- a. Grade level
- b. Activity used
- c. Lesson objectives
- d. Outline of presentation procedures
- e. Methods for evaluating or assessing student progress and growth
- f. State or national standards (mathematics or science) addressed