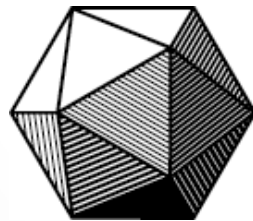# History the Hood Way

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Weaving history into the major

- Mathematics as part of the liberal arts

- From the Department's Mission Statement:

  …Students in all courses use mathematical reasoning in both theoretical and applied settings, **explore major ideas in their historical context**, and learn problem solving skills and the application of appropriate technology in the solution of problems.

Strategies

- Historical readings

- Class activities, assignments

- Projects

- Summer research

- Senior seminar

Readings

- *The Mathematical Universe:* all students purchase in Calculus I, use in every subsequent course
- *Readings for Calculus:* instructors post readings, hold discussion, give quizzes
- Geometry: historical background for Euclidean, non-Euclidean geometries
- Textbooks for upper-level courses chosen for historical approach
  - Bressoud, *A Radical Approach to Real Analysis*
  - Focus on history blurbs in other texts: Differential Equations, Linear Algebra

Problems

- Historical problems used in class activities, assigned as homework.

  Examples:
  - Number Theory:
    - Work problems from Diophantus at beginning of semester
    - Watch Nova video about Andrew Wiles at end of semester
    - Connect elliptic curves to Diophantine problems

  - Real Analysis:
    - Work problems based on Briggs' principle, used to compute first table of base-ten logarithms

Class demonstrations/ discussion

- Examples:
  - Modeling and Simulation
    - Build a model of a pendulum clock
    - Discuss the history of timekeeping

  - Graph Theory
    - Discuss Heawood's and Kempe's attempts to prove the Four Color Theorem
    - Study the history of the Mathematical Institute of Oberwolfach (a graph theory problem is named for it)

  - Discrete Mathematics
    - Read chapter in *Mathematical Universe* about Bertrand Russell
    - Watch the documentary "N is a Number" about Paul Erdős
    - Discuss/compare

Historical Projects

- Examples:
  - Numerical analysis
    - Prepare a 25-minute oral presentation on a mathematician who has contributed to the field of numerical analysis.

  - Graph theory
    - With a partner, research a famous graph theory problem and write a paper about its history and its solution. Present to class orally.

  - Scavenger hunts: finding historical information on the Internet

Summer Research

Hood Summer Research Institute
(Eight weeks, students and faculty working together)

Past examples:
- *Gerbert and the Spanish March*

- *Approximations to Pi throughout History*

- *Women and Mathematics in the Time of Euler*

  Talks at Section meetings and MathFest

Senior Seminar in the History of Mathematics

- Students do historical readings and report.

- Recent texts used in the course
  - Wardhaugh, *How to Read Historical Mathematics*
  - Hodgkin, *History of Mathematics: From Mesopotamia to Modernity*
  - Dunham, *Journey through Genius*
  - Perl, *Math Equals: Biographies of Women Mathematicians*
  - Joseph, *Crest of the Peacock: Non-European Roots of Mathematics*

- Other readings from various books and journal articles.

- Write a book review on a book about the history of mathematics
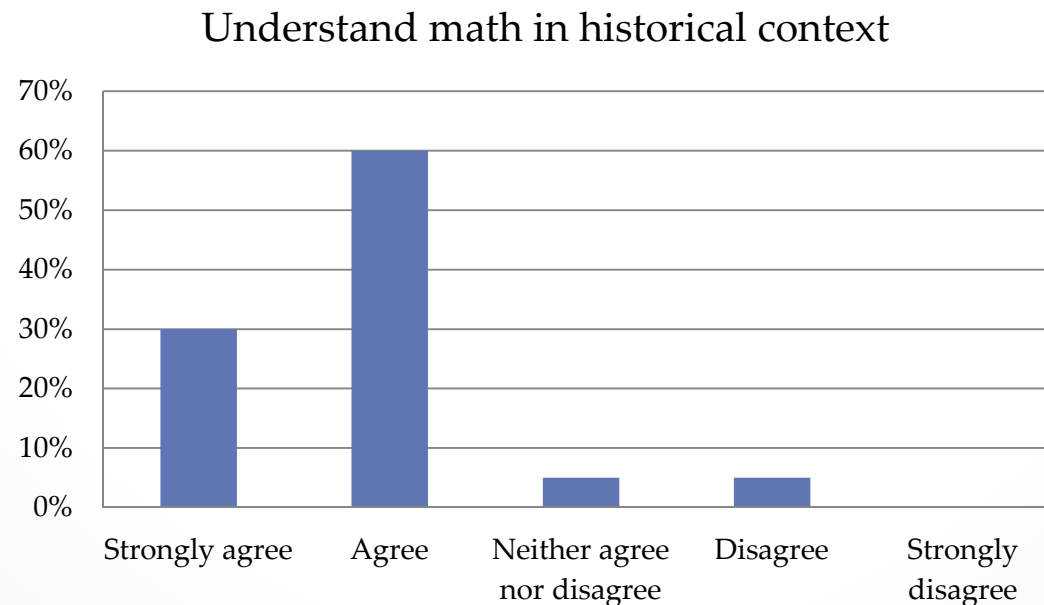
Seminar, continued

- Work math problems from another time (from Eves, or *Math through the Ages*, etc.)
- Visit the National Museum of American History, visit Peggy Kidwell, tour the "attic"
- Visit the Library of Congress
- Attend Smoky Mountain Undergraduate Conference in the History of Mathematics
- Make and display a poster about a history topic
- Research paper
  - Semester-long project
  - Literature search, annotated bibliography
  - Outline, draft, final paper

Achieving our Goals

- Six over-arching goals for the major in mathematics.
  Goal 6: **Students will understand mathematics in its historical context.**

- Objectives:
  o Whenever possible, students will learn mathematics in the context of its historical development.
  o Students will learn about the history of mathematics and communicate it to others.
  o Students will learn about the contributions of women and non-Western scholars to the development of mathematics.

Senior exit survey

- Students were asked to respond to the statement:
  The program in mathematics helped me understand mathematics in its historical context.

- Results from May 2012

Understand math in historical context

70%	
60%	
50%	
40%	
30%	
20%	
10%	
0%	

Strongly agree   Agree   Neither agree nor disagree   Disagree   Strongly disagree

Student comments

- (I learned about the history of math in) History of Mathematics, some also in number theory, numerical analysis, and discrete mathematics.

- I was able to see where mathematics began, as well as how it evolved. It was so interesting to see the various notations, to see that it wasn't always algebraic, as we write equations now.

- History of Math Seminar was one of my top two favorite math classes taken.