# Teaching History of Mathematics
## A Course for High Schools
## (Session #95)

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## Georgia Math Conference at Rock Eagle, October 19, 2023

# Outline

## Standards

## The Course

## The Topics

## My Course

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## My Course

# Standards

State Course number: 27.08630

Big Ideas
1. Numerical Reasoning
2. Logical, Mathematical, & Investigative Reasoning

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Big Ideas
1. Numerical Reasoning
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Mathematical Practice standards (HM.MP.1 through 8) and
Mathematical Modeling standards (HM.MM.1.1 through 1.4) are
interwoven throughout the course

# Standards

HM.NR.2   Explore and use historical number systems and computational methods.

HM.LMIR.3   Engage in the mathematical and cultural accomplishments of the ancient Greeks in order to grasp the foundational aspects of modern mathematics.

HM.LMIR.4   Engage in the mathematical and cultural accomplishments of the world's societies in the fifth century through the fifteenth century in order to grasp the foundational aspects of modern mathematics.

# Standards

HM.LMIR.5  Engage in the mathematical and cultural accomplishments of Europe in the fifteenth century through the early seventeenth century in order to grasp the foundational aspects of modern mathematics.

HM.LMIR.6  Engage in the mathematical and cultural accomplishments of the world's societies in the late seventeenth century through the early twentieth century in order to grasp the foundational aspects of modern mathematics.

HM.LMIR.7  Investigate and describe modern mathematicians and their contributions to mathematics.

# Standards

In other words. . .

HM.NR.2 The Ancients

HM.LMIR.3 The Greeks

HM.LMIR.4 The Middle Ages

HM.LMIR.5 The Renaissance

HM.LMIR.6 The Modern Age

HM.LMIR.7 The Twentieth Century

# Outline

Standards

**The Course**

The Topics

My Course

# The Course

- First written as a two-semester course in 2002-03 under QCC
- Approved in Spring 2003
- First taught 2003-04

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- First written as a two-semester course in 2002-03 under QCC
- Approved in Spring 2003
- First taught 2003-04
- Rewritten as a one-semester course 2009-10 under GPS
- Approved 2010
- Re-rewritten 2019-20 as a two-semester course
- Approved 2021

# The Course

I have been teaching this course for 20 years.

There are many ways to approach a history of math course!

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There are many ways to approach a history of math course!

Initial approach: choose a good textbook and follow it, supplementing as I needed or wanted.

By 2010, my approach was to present "Math's Greatest Hits!"

# The Course

Based on Howard Eves' books, published by MAA, 1984



*Great Moments in Mathematics*
*Before 1650*



*Great Moments in Mathematics*
*After 1650*

# The Course

Later I refined my approach further.

# The Course

Later I refined my approach further.

I want to provide an answer to the question

<span style="color:red">What and who influenced the way we do math today?</span>

# The Course

Why offer the course?

- Good for students who would like to like math, but don't
- Good for students who can do math, but don't know why they do it the way they do
- A review of geometry before the SAT
- Students get a broader sense of math in culture (influences, inventions, people)
- Exposure to non-European contributions to mathematics
- Exposure to mathematical concepts not encountered anywhere else in the curriculum (quaternions, non-Euclidean geometry, transfinite numbers, . . . )
- It is a "math appreciation" course

# The Course

Who can take the course?

- Prerequisite is calculus, or calculus taken concurrently
- Two-semester curriculum

# The Course

Textbooks I have used:

- Katz, *A History of Mathematics: an Introduction*, 2nd ed.,
  Pearson, 1998 (used until 2010)
  - Newer 3rd ed., Pearson, 2008
- Berlinghoff and Gouvêa, *Math Through the Ages*, 2nd
  "expanded" ed., Math. Assoc. of America, 2004 (since 2011)
  - Newer 3rd "expanded" ed., Amer. Math. Society, 2016

# The Course

Other good textbooks:

- Cooke, *The History of Mathematics: A Brief Course*, 3rd ed., Wiley, 2012
- Burton, *The History of Mathematics: An Introduction*, 7th ed., McGraw-Hill, 2010
- Stillwell, *Mathematics and Its History*, 3rd ed., Springer, 2010

A list of suggested books is in my Google drive folder!

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# The Ancients

HM.NR.2: Explore and use historical number systems and computational methods.

- Origins
- Babylon, Egypt, China
- Computations
- Linear algebraic equations
- Inductive Geometry
- Thales, Pythagoras

# The Greeks

HM.LMIR.3: Engage in the mathematical and cultural accomplishments of the ancient Greeks in order to grasp the foundational aspects of modern mathematics.

- Discovery of irrationals
- Origin of Axiomatics
- Euclid's *Elements*
- Archimedes, Ptolemy, Diophantus

# The Middle Ages

HM.LMIR.4: Engage in the mathematical and cultural accomplishments of the world's societies in the fifth century through the fifteenth century in order to grasp the foundational aspects of modern mathematics.

- Evolution of algebra
- Evolution of numerals
- Islam, China, India
- Fibonacci

# The Renaissance

HM.LMIR.5: Engage in the mathematical and cultural accomplishments of Europe in the fifteenth century through the early seventeenth century in order to grasp the foundational aspects of modern mathematics.

- Solution of cubics
- Perspective
- Logarithms
- Astronomy
- Analytic geometry
- Probability

# The Moderns

HM.LMIR.6: Engage in the mathematical and cultural accomplishments of the world's societies in the late seventeenth century through the early twentieth century in order to grasp the foundational aspects of modern mathematics.

- Calculus
- Euler
- Lagrange, Laplace, Legendre, Fourier
- Gauss

# Abstraction

HM.LMIR.7: Investigate and describe modern mathematicians and their contributions to mathematics.

- Non-Euclidean geometry
- Non-commutative algebra
- Groups
- The *Erlanger Programme*
- Cantor's set theory
- Metamathematics
- Godel's incompleteness theorem
- Today's mathematicians

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# My Course

Syllabus

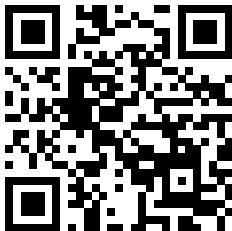| | |
|---:|:---|
| Length | One semester (Spring) |
| Problems | 15 weekly problem sets, called Last-Minute Problems |
| Readings | Classroom discussions or LMS forum posts from assigned textbook readings |
| Tests | Mid-term and Final: open book, open notes, open internet |
| Paper | Biographical research paper, student's choice |
| Project | Student's choice from *Math Through the Ages* textbook |

# Questions?

Contact:
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**Please fill out the session survey!**



This was session #95.