Math 190 : History of Mathematics

California State University, Sacramento · Department of Mathematics & Statistics

This one semester course is a study of the historical development of mathematical ideas and techniques through the advent of calculus and their impact on the general course of the history of western civilization. Part of the goal of the course is that students develop some understanding (and even appreciation) of the role of mathematics in different cultures, of the mathematics as it was done in those societies; and of how our view of mathematics today has developed. As part of this course, students develop an understanding of the contributions to mathematics by men and women of different cultures.

As part of the course, students write a paper on a topic approved by the instructor.

Throughout the course, students work with the mathematics as it was done at the time, and develop an ability to reason inductively and formulate and prove general statements. They study approcahes used by various societies to real problems, and they develop an appreciation of the connections among the areas of math from an historical perspective.

Catalog Description

Study of the development of mathematical ideas and techniques and their impact on the general course of the history of western civilization. **Graded**: Graded Student. **Units**: 3.0.

Prerequisites

Math 31 and upper division status in mathematics.

Text

In addition to traditional texts on the history of mathematics, such as those by Eves and Burton, other texts that are used include *Ethnomathematics* by Ascher, and *The Crest of the Peacock* by Joseph.

Course Outline

I. Numeral Systems

(Includes Incan Quipu, Counting Systems without Writing, a variety of numeral systems, and the role of zero)

II. Babylonian and Egyptian Mathematics

(Includes numeral systems, question of zero, geometric, arithmetic, and algebraic results, solutions to polynomial equations, the "Babylonian Method", Plimpton 322, ideas related to π)

III. Pythagorean Mathematics

(The study of the main results of the Pythagoreans, and a number of proofs of the Pythagorean Theorem are done)

IV. The Three Famous Problems

(Includes work with straightedge and compass, a variety of "solutions" to the three famous problems, and an understanding of why the three famous problems cannot be solved with only a straightedge and compass)

V. Euclid's Elements

(Includes an understanding of axiom statements, work in number theory, and a wealth of problems in geometry)

VI. Greek Mathematics After Euclid

(Includes ideas of Archimedes, Eratosthenes, Apollonius, Heron, Diophantus, Pappus, Hypatia)

VII. Chinese, Hindu, and Arabic Mathematics

(Includes ideas related to zero and infinity, approximations to π, approximations to roots of nth order equations, the idea of matrices, the Chinese Remainder Theorem, Pascal's Triangle, roots of polynomials, results in combinations and permutations, ideas of infinity, trigonometry, power series and the beginning of calculus. Also recognizes that many mathematical results that are credited to Western Mathematics were discovered much earlier by mathematicians of other cultures)

VIII. European Mathematics, 500-1600

(Includes ideas from Fibonacci, and the solution to cubic and quartic polynomial equations)

IX. The Seventeenth Century and Analytic Geometry

(Includes ideas from Napier, Galileo, Kepler, Desargues, Pascal, Descartes, Fermat)

X. Development of Calculus

(Includes early work from Archimedes, Arybhata, Brahmagupta, Bhaskaracharya, and then the later work of Cavalieri, Barrow, Fermat, Newton, Leibniz)