

Summer Semester 2002

EDUC 411 - 3
Investigations in Secondary Mathematics

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Wednesday 8:30-12:20 in EDB 7600

D01.00

PREREQUISITE

Co-req EDUC 415 or appropriate Math background & permission of Instructor.

SCHEDULE

It is a 3-credit course. To fulfill the requirement of 39 instructional hours (3 x13) we will meet in a scheduled 4-hour slot for the first 10 weeks of the semester.

OUTLINE

The goal of the course is to examine secondary mathematics from an advanced standpoint, to broaden the understanding of key topics by drawing connections among various topics and representations and by situating them in a broader context, both mathematical and historical. The means towards this goal is intensive problem solving experience, followed by reflection.

The course will involve lecture, seminar and workshop format, without explicit distinction between the different formats.

The following is the list of topics to be addressed. The list is not sequential, as the connections among various topics are of interest in this course:

Numbers and Number systems

Number systems from different civilization

Number representations in different bases

Computation in different bases, fractions in different bases, divisibility rules in different bases -- implications for base-ten

Critical Number sets (natural, whole, integer, rational, irrational, real)

Relevance of their historical development to the curriculum

Functions

Examination of various definitions for a function

Representation of functions in different coordinate systems (afine, focus-directrix)

Transformation of functions

Geometry

Axiomatic systems (Euclidean, finite)

Geometry on a sphere, implications for the plane

Taxicab Geometry, implications

Investigations in Euclidean Geometry with Geometer's Sketchpad

Conic Sections

Examination of various definitions, proving their equivalence

Probability and Statistics

Examination of popular games and winning chances

Monty's Dilemma

Bingo

Slot Machines

How to lie with Statistics - a critical look

Calculus

(Some) Fascinating theorems and formulas of mathematics

Where do they come from?

Why do they "work"?

What is fascinating about them?

REQUIRED READING

There is no textbook for this course. Materials will be provided by the instructor.

Duplicating fee: Approx. \$15.

GRADING: The course will be graded pass/withdrawal. Students must get a passing grade on each assignment in order to pass the course. Assignments include:

- Weekly homework

- Problem solving portfolio

- Project and presentation