

**SIMON FRASER UNIVERSITY  
SUMMER SEMESTER 2009**

**EDUC 411-3  
INVESTIGATIONS IN SECONDARY MATHEMATICS  
(D100)**

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TUESDAY 1:30-5:20 EDB 8620F

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**PREREQUISITE:** It is recommended that this course is taken concurrently with *EDUC 415 Designs for Learning Mathematics: Secondary*.

**SCHEDULE:** This is a 3-credit course. To fulfill the requirement of 39 instructional hours (3 x 13) we will meet in a scheduled 4-hour slot for 10 weeks during the semester.

**DESCRIPTION**

The goal of the course is to examine secondary mathematics from an advanced standpoint. More specifically, the goal is to extend the understanding of key topics from high school mathematics by situating them in the broader mathematical and historical contexts, and by drawing connections between key topics. Though the course content comes from mathematics, the approach is a pedagogical one, which draws on the knowledge and practices from education rather than applying the lecture/tutorial format most commonly seen in undergraduate mathematics courses. Students will engage in problem solving, investigate conjectures, and reflection on both the content and the process. The following is a possible list of topics to be addressed. The list is not exhaustive, nor is it sequential:

- **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), and 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), and transformation of functions.

- **Geometry**

Axiomatic systems (Euclidean, finite), geometry on a sphere and implications for the plane, taxicab geometry, and investigations in Euclidean Geometry with Geometer's Sketchpad

- **Conic Sections**

Examination of various definitions and proving their equivalence.

- **Probability and Statistics**

Examination of popular games and winning chances, Monty's Dilemma, bingo, slot machines, and how to lie with statistics - a critical look.

- **(Some) Fascinating theorems and formulas of mathematics**

Where do they come from? Why do they "work"? What is fascinating about them?

**REQUIREMENTS**

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.

**REQUIRED TEXT**

Reading materials will be provided by the instructor.  
There may also be a textbook – but it will cost under \$30.

*Students in all Faculty of Education courses are encouraged to review policies pertaining to academic integrity available on the Undergraduate Programs website:*

[http://www.educ.sfu.ca/ugradprogs/student\\_resources/index.html](http://www.educ.sfu.ca/ugradprogs/student_resources/index.html)